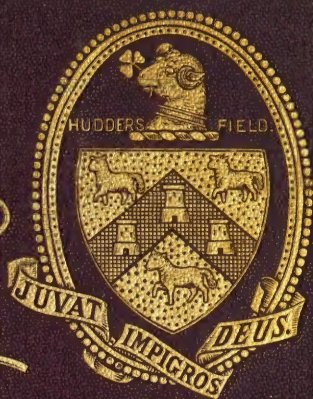






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YORKSHIRE,

PAST AND PRESENT.



Engraved by E. P. Brandard.

SCARBOROUGH.

YORK & HALL

AND PROVED

THE STATE RECORDS OF THE STATE OF NEW YORK

FROM THE YEAR 1784 TO THE YEAR 1800

IN TWO VOLUMES

VOLUME THE FIRST

BY THOMAS M. CLARK

ALBANY: J. B. KNEELAND, 1800

BY J. B. KNEELAND

YORKSHIRE,

PAST AND PRESENT:

A HISTORY AND A DESCRIPTION OF

THE THREE RIDINGS OF THE GREAT COUNTY OF YORK,

FROM THE EARLIEST AGES TO THE YEAR 1870;

WITH AN ACCOUNT OF ITS

MANUFACTURES, COMMERCE, AND CIVIL AND MECHANICAL ENGINEERING.

BY THOMAS BAINES,

AUTHOR OF "LANCASHIRE AND CHESHIRE, PAST AND PRESENT," ETC.

INCLUDING

AN ACCOUNT OF THE WOOLLEN TRADE OF YORKSHIRE,

By EDWARD BAINES, M.P.,

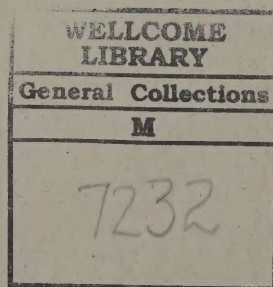
AUTHOR OF "THE HISTORY OF THE COTTON MANUFACTURE," ETC., ETC.

VOL. I.

WILLIAM MACKENZIE, 22 PATERNOSTER ROW, LONDON;

LEEDS, 27 PARK SQUARE; LIVERPOOL, 14 GREAT GEORGE STREET;

MANCHESTER, 65 DALE STREET; NEWCASTLE-ON-TYNE, 74 CLAYTON STREET.



ADDRESS BY MR. THOMAS BAINES.

IN undertaking to write a History and Description of my native County of York, it is my object to bring together, within the limits of one work, as much as I am able to include of the information respecting that County which is now scattered through many works, or which is to be collected from the memories of persons born within the County or who have spent the greater part of their lives in the midst of its interests and occupations. From the extent of country which has to be described, at least in its principal features, and from the numerous branches into which a history going back for so many centuries, and constantly increasing in importance, down to the present time, naturally divides itself, I should not have ventured to undertake this task had it not been rendered possible of execution by the accumulation, especially during the last forty years, of immense masses of information on separate departments of the subject, the most valuable portions of which it is my desire to unite in one work.

Local history, and especially the history of widely extended, populous, and rapidly improving English counties, has always possessed a great interest in this country, chiefly from the fact that society has been developed by local influences and local efforts to a greater extent in England than in any other country of Europe. From the earliest times of the English race this part of the kingdom has had a strongly-marked local organization. The division of the County or Shire into three Ridings, as they are now called, goes back to a time so early as to render it impossible to speak with certainty as to the year, or even the reign, in which it originated. Several of the existing boroughs of Yorkshire have been represented in Parliament from the time when the earliest parliaments were assembled by the kings of England; and some of them were probably represented in the old Anglian Witans, or parliaments, which were held at York for ages before the Norman Conquest. In the great changes which have taken place in later times the County of York has generally taken an active part; and in more modern times, as society was assuming its present form, the influence of this great county and its ever increasing population have constantly increased. At the present time it is represented by nearly fifty members in the Parliament of the United Kingdom, and it exercises at least as large a share as any other English county in the general government of the country. Many of the principal branches of its industry can be clearly traced from the time when the industry of England first began to awaken, after ages of tumult and strife. And the most important of these can be connected with local causes, and still possess much of a local character. It will be my object in this work to trace the several branches of the local History in this great county, and to show what portion they form of the general development of the kingdom.

At the commencement of the present century the population of the County of York was considerably less than one million persons, not amounting to more, according to official returns, than 859,133 souls; when my father, the late Edward Baines, M.P., published his "History of the County of York," &c., in the year 1823, it was estimated that the whole county contained about 1,100,000 persons; in the year 1851 it was found that the population had increased to 1,797,995 persons; ten years later the population of Yorkshire had risen to upwards of two millions, or, according to the official returns, to 2,015,841; and the latest returns of the Registrar General, recently published, show that the population of the whole county in the year 1868 was estimated at 2,202,160 persons. The actual population is probably larger; for whilst the area of the County of York, as ascertained by the recent Ordnance Survey, is 3,923,697 acres, the quantity of territory included in what is called the Registration County of York is not more than 3,654,636 acres. There are few, if any, other English counties which at the present time can show so large a population and so rapid an increase of numbers. Every year, therefore, the local History of the County concerns a larger portion of the people. When my father wrote his account of the County of York, more than forty years ago, he stated very truly that "the County of York held a distinguished rank among the great divisions of this kingdom; and that faithfully to delineate the leading features of its History would be considered an object of laudable ambition." That also is my opinion and my ambition; and the more so because in the interval between the year 1823 and the present time many great discoveries have been made, bearing upon the History and Description of this County, which were at that time altogether unknown, and which gives to it a greatly increased interest.

At the time when my father's work was published, the science of Geology, with its wonderful bearings on the past history of the world and its present influence on the development of society, could scarcely be said to exist, although my father had the advantage afforded by the assistance of William Smith, the father and founder of modern Geology, in drawing up an original article of the Geology of the West Riding. Since that time Geology has

become a science, and the formation of this extensive portion of the kingdom has been laid open by many distinguished writers, of whom two of her own sons, Professor Sedgewick and Professor John Phillips, justly stand in the highest rank amongst the creators of that science. It is my intention in this work to show how immense has been the influence which the causes and the phenomena, so admirably described by these and other writers, have had on the industrial development, and the increase of employment and of profitable occupation, in the County of York, and how inseparably they are connected with its skilful agriculture, its immense mineral wealth, its flourishing manufactures, and its widely extended commerce.

It is also my wish to show, in the present work, how the recent discoveries in the history of languages of ancient nations, and in the arts and modes of life in ancient times, throw light on the early history of the inhabitants of this extensive district; and how, in return, the discoveries and the extensive antiquarian researches made in this county for many years, and continued to the present time, connect themselves with the discoveries in the history of nations made in other parts of the kingdom, and in other parts of Northern Europe.

Within the last thirty years the early history of the Germanic and Scandinavian tribes of whom we are the descendants, has received a wonderful increase of light from the researches of eminent scholars. The origin of English poetry in the Abbey of Whitby, and of English history under the patronage of the Northumbrian kings of York, have both been clearly shown. We are also able to trace amongst the valuable publications of the Record Commission, and those published by direction of the Master of the Rolls, as well as those of the Surtees Society, the history of these districts from the earliest times to recent periods.

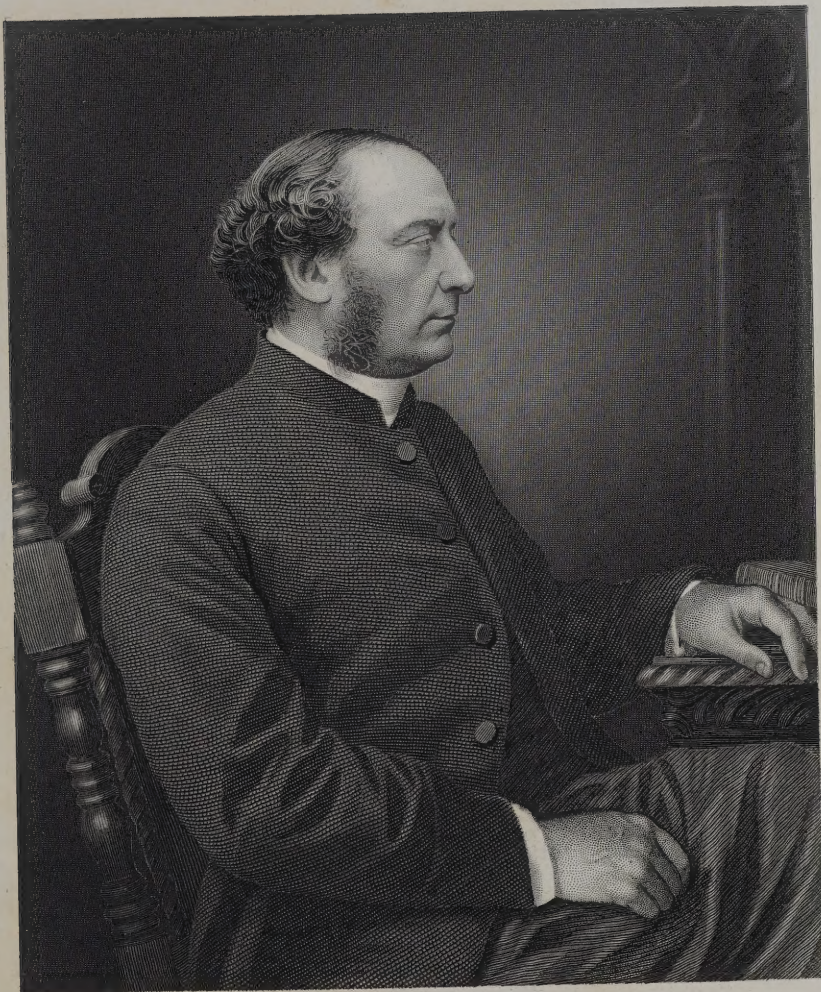
There is also a branch of local history which deserves to be more fully developed than has yet been done; viz., that of the public works executed in various ages in this extensive county, and their influence on public wealth and individual prosperity and comfort. Even within our own lives the whole of the modes of locomotion, and the means of transport both of persons and products by land and by sea, have been completely revolutionized. The result has been to apply the great powers of nature to the assistance of the feeble strength of men, and by ingeniously devised inventions to give to man a command which he never before possessed over matter in almost all its forms, and for every purpose to which it can be applied.

It is also my wish, in this work, to trace the History of the Progress of Society in this part of England more fully than has yet been done, and to show what has been the condition of the various classes of this portion of the English people from the earliest times to the present day. In early times the evidences of the condition of the people are very obscure, and have to be sought for amongst many insignificant details. As we come down to modern times we obtain additional light as to the condition of all classes; and in modern times an almost overwhelming mass of materials have been collected, bearing on this subject, which require to be analyzed and arranged, to render their general results useful.

One of the most striking characteristics of Yorkshire is the beauty and endless variety of its natural scenery. Another is the great variety of scenes and objects of historical interest which are included within its wide limits. These shall be described separately.

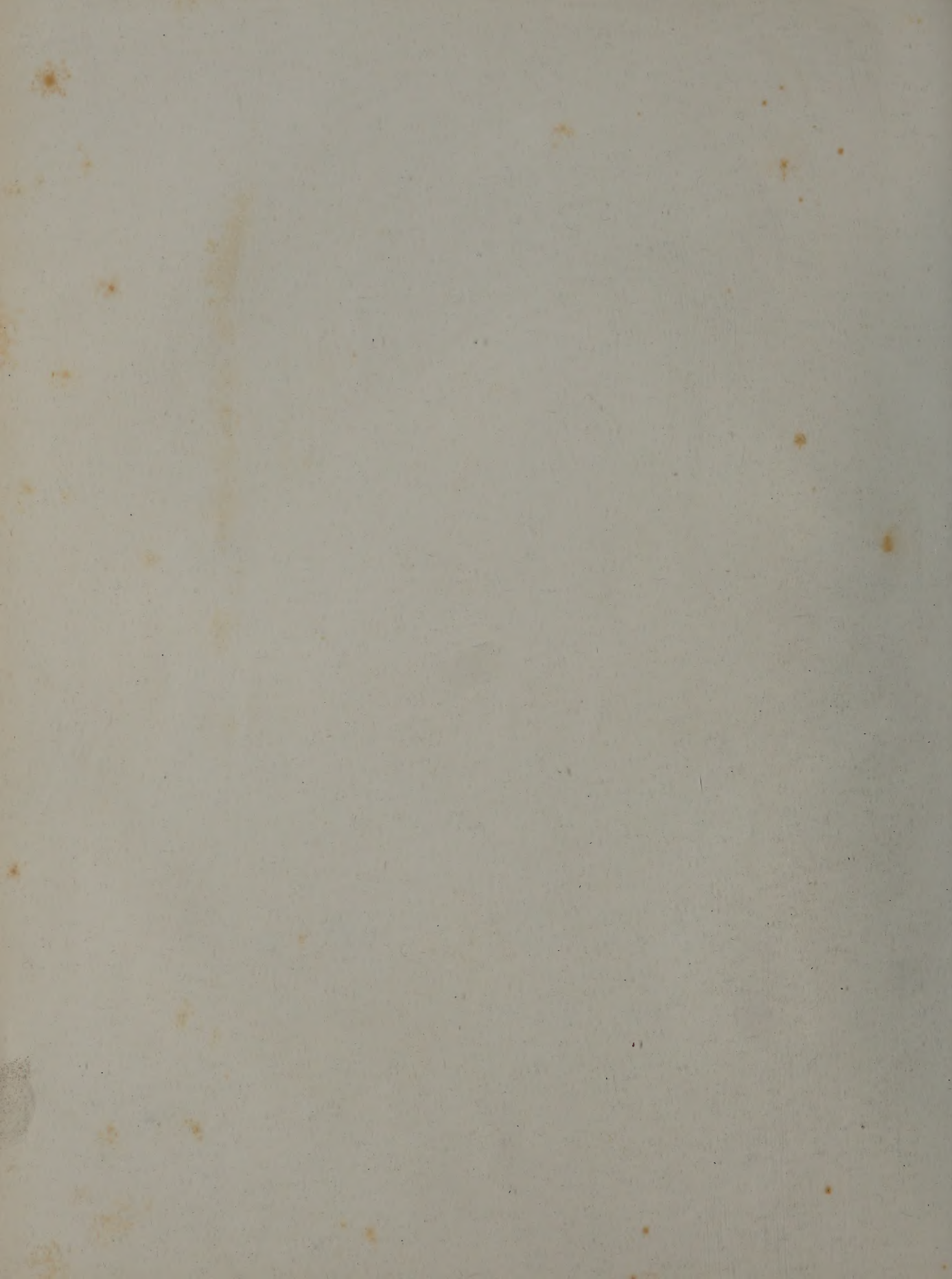
The number of Cities and Towns within the County of York is great, and rapidly increasing. On both the occasions in the present generation in which the representative system of the County has been changed, so as to adapt it to the existing population and to the existing wants of society, it has been found necessary to give an increased representation to the landed interest and the agricultural population of the County, and also to the varied interests of the large towns. Forty years ago the County of York had two members to represent it in Parliament, and it has now ten. It had at that time thirty city and borough members; it has now thirty-eight, notwithstanding the disfranchisement of Aldborough, Boroughbridge, and Hedon, and the reduction of from two to one member of the representation of Malton, Thirsk, Richmond, Ripon, and Knaresborough. Thus, notwithstanding the loss of ten seats in small boroughs, there is an aggregate increase of eight members in the whole number returned—a result which shows a great increase both of the agricultural and trading districts of the county.

In preparing this work I have received offers of assistance from several quarters. My brother, Mr. Edward Baines, M.P., has kindly favoured me with an account of the Woollen Manufacture, especially in the Leeds district; and I have other promises of co-operation and support which will add very greatly to the value of the work.



Engraved by W. Hall from a Photograph.

THE RIGHT HON; AND MOST REV; WILLIAM THOMSON, D.D.
ARCHBISHOP OF YORK.

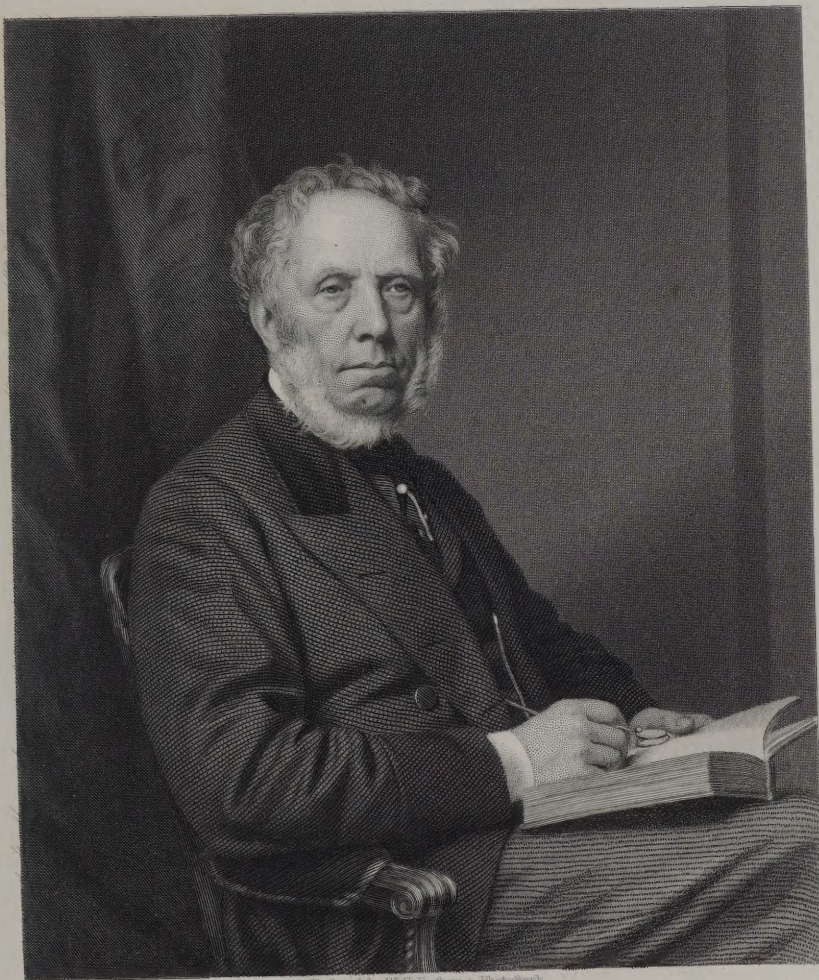




Engraved by John Gouley

RIPON MINSTER.

WILLIAM BARNES, LONDON, GLASGOW & LEITH.



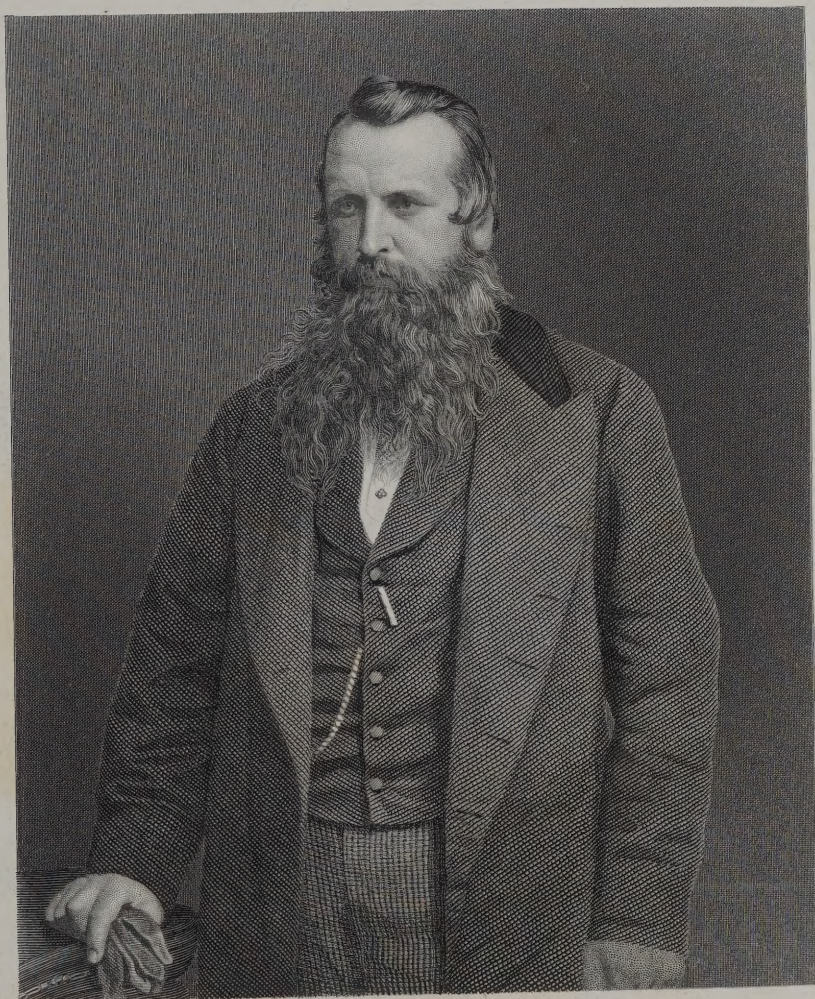
Engraved by W. Holl, from a Photograph.

EDWARD BAINES, ESQ., M.P.

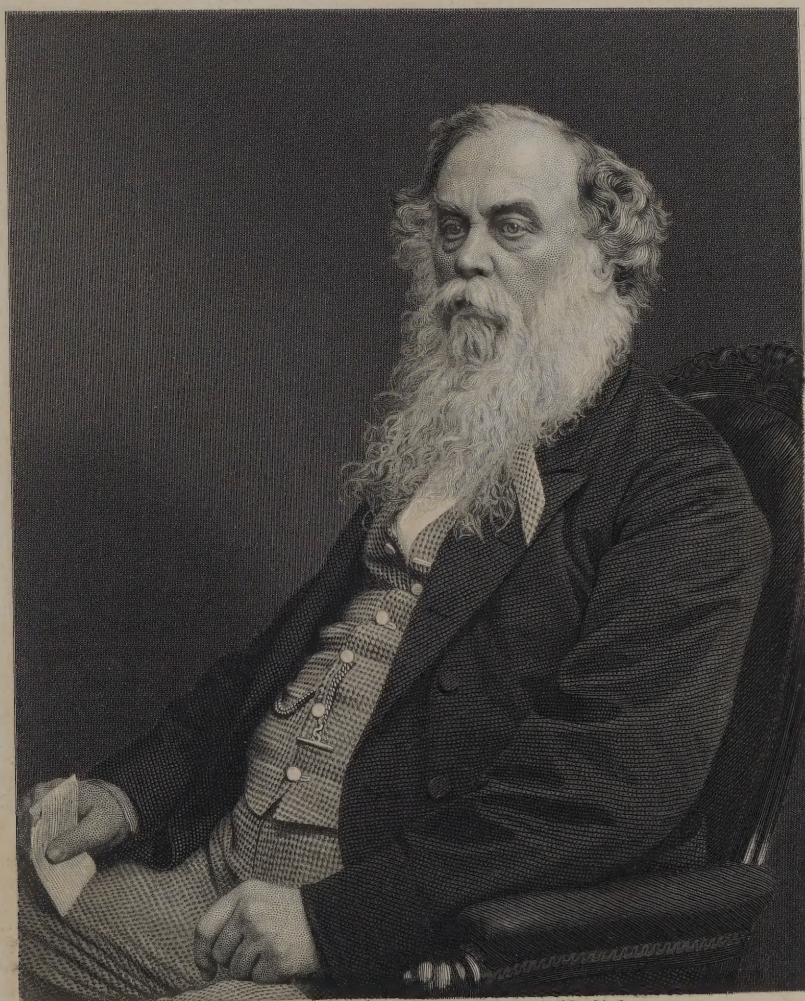
WILLIAM MACGREGOR, LONDON, GLASGOW & EDINBURGH.



TOWN HALL, LEEDS.



SIR FRANCIS CROSSLEY, BART.



Engraved by W. Hall, from a Photograph by Appleton & Co Bradford.

SIR TITUS SALT, BART.

YORKSHIRE:

PAST AND PRESENT.

CHAPTER I.

GENERAL DESCRIPTION OF THE COUNTY OF YORK.

YORKSHIRE, the largest of English counties, and in wealth, resources, and population amongst the most important, is situated near the middle of the island of Great Britain, at the narrowest part of England, on the shores of the German Ocean, and within easy distance of the Irish Sea and, through that sea, of the Atlantic. This great county extends over an area of nearly four million acres, or 6130 square miles, and contains a population of about two millions and a quarter of inhabitants. The general form of the county is that of an irregular quadrangle, extending about one hundred and forty miles in its greatest breadth, from the lofty mountains at the north-western angle of the county, to Spurn Point, at the mouth of the Humber on the south-east; and about ninety miles from the mouth of the river Tees on the north-east, to the point of junction of the counties of York, Derby, and Chester on the south-west. The average length of the county from north to south is about eighty miles, and its average breadth from east to west about ninety. The natural boundaries of Yorkshire are strongly marked by rivers, ranges of hills, and the sea. On the north it is separated from the county of Durham by the river Tees, which flows along the northern boundary of the county, with a rapid course, almost from the point where it rises in the western chain of mountains, to that at which it falls into the German Sea. On the south, Yorkshire is separated from the adjoining counties of Derby, Nottingham, and Lincoln by the broad estuary of the Humber, the

river Don, and by the range of hills from which that river flows. On the west it is divided from the counties of Lancaster, Chester, and Westmoreland by the lofty range of hills and mountains running from north to south, and known as the Backbone of England, or the Penine Chain; and on the east its bold and rugged shores are washed by the waves of the German Ocean. The territory included within these limits was ascertained by the recent Ordnance Survey to contain 3,923,697 statute acres, or rather more than 6130 square miles. This is more than twice the size of any other English county; Lincolnshire, the next in magnitude, covering an area of not more than 1,775,457 acres, and Devonshire an area of 1,657,188 acres. The natural resources of the county of York are great and varied, being alike derived from a fertile soil; from rich minerals, of which coal and iron are the most abundant and valuable; from numerous rivers and smaller streams, supplying water-power in great abundance; from safe harbours, available for trade and commerce; and from valuable fisheries on the sea-coasts, and in some of the principal rivers. The county is divided into three Ridings, the West, the East, and the North, the extent of which, as well as that of the whole county, is as follows:—

AREA OF THE COUNTY OF YORK.

	Acres.	Roods.	Perches
East Riding,	791,672	3	15
West Riding (including Ainsty),	1,768,380	1	2
North Riding,	1,361,664	2	26
City and County of the City of York,	1,970	3	3
York Castle, &c.,	8	1	38
Total,	3,923,697	0	0*

The Mountain Ranges, Dales, Plains, and Rivers of Yorkshire.—The natural features of the county of York are very strongly marked. Its most prominent features, and those which are most closely connected with the nature and the development of its resources, are two ranges of mountains or hills running from north to south, the one on the western boundary of the county, the other, of inferior elevation, near the shores of the German Sea, both sending numerous ranges of hills into the interior, from the western and the eastern sides of the county. These secondary ranges are separated from each other by deep and winding valleys or dales, which all

* Index to the Ordnance Survey of Yorkshire—1847–1853.

terminate in one great plain, in the middle of the county, known as the Vale of York, extending from north to south, from the banks of the Tees to those of the Don, a distance of nearly one hundred miles. In this plain nearly the whole of the rivers which descend from the hills and water the valleys, both on the eastern and western side of the county, flow into the bed of the river Ouse, and discharge themselves down its stream into the river or estuary of the Humber, which is the great receptacle of the waters of Yorkshire. A few streams, generally of smaller size, descend from the more eastern of these ranges of hills, and reach the German Ocean after a short and rapid course; whilst two or three flow from the western range into the Irish Sea.

The Western Range of Mountains, or the Penine Chain.—The more lofty of the two ranges of mountains, which we have spoken of as bounding or intersecting the county from its northern to its southern extremity, is generally known either as the Backbone of England, or the Penine chain. This range of mountains and hills, whose ridges and most elevated peaks generally form the western boundary of the county of York, separating it from the counties of Westmoreland and Lancaster, commences, at its northern extremity, amongst the higher ranges of Northumberland and Durham, and joins the mountains of the Lake district, which are the highest in England, reaching an elevation in several cases of more than 3000 feet.* These hills run southward from Westmoreland and Cumberland through the counties of York, Lancaster, and Derby, to the banks of the river Trent, which river winds around their western, southern, and eastern slopes in its course to the Humber. Where the Penine chain enters the county of York, at its north-western extremity, it has lost something of its original elevation, though it still rises to the height of more than 2500 feet at Mickle Fell (2581), the highest mountain in Yorkshire.† From that point it retains nearly the same elevation until it reaches the springs of the river Ribble, near which the bold summits of Pennegent (2270 feet), Ingleborough (2361 feet), and Whernside (2384 feet), three of the noblest mountains between Tweed and Trent, rise to an almost equal elevation. The Penine chain still retains a great elevation until it reaches the south-western limits of the county of York, frequently rising to the height of 1600 to 1800 feet. After

* Geological Map of England and Wales, by Andrew C. Ramsay, F.R.S. and G.S., local director of the Geological Survey of Great Britain.

† Ordnance Survey of Yorkshire, 1847-53.

leaving the southern boundary of this county, these ranges spread southward through Derbyshire, and along the borders of Cheshire and Staffordshire, retaining their elevation at the Peak of Derbyshire, at Axe Edge (1809), and Mow Cop (1101), and then gradually sinking into the great central plain of England.* The causes which raised this extensive range of mountains—with its heath-covered moors, its mountain-limestone pastures, its fertile clay soils, its numerous streams, and its rich beds of minerals—from the depths of the ocean, thousands of years ago, in a great measure decided the method in which society, industry, and population should develop themselves in the western districts of Yorkshire in modern times.

The Eastern Range of Mountains and Hills.—Highly important also in their influence on the development of modern society were the causes which, at some remote period, raised from the ocean the lofty rocks, the rich mineral beds, and the fertile soils, which extend from the coasts of the North and East Ridings of Yorkshire into the interior of those two Ridings. These mountains and hills are of the Lias, the Oolite, and the Chalk formations, and belong to strata which are not found in any part of Great Britain lying north of the county of York. They appear to emerge from the German Ocean, on the coasts of the North and of the East Ridings, whence they spread westerly, and then run in a southerly direction to the southern borders of Yorkshire. After passing under the Humber the strata rise again, increase in width, and spread over the midland, eastern, and southern counties of England, until they again reach the British Channel, and disappear beneath its waters.

Amongst the greatest elevations above the level of the sea attained by the rocks and beds of the Lias, the Oolite, and the Chalk formations, are those which they reach on the fine cliffs, the wild moors, and the extensive wolds of the North and East Ridings. At some of the highest points of the Cleveland district the mountains formed by the Oolitic rocks rise to a height of about 1500 feet; as at the Tumuli, Urra Moor, 1489—a greater elevation than they attain in any other part of England, and twice or three times the average height of hills of that description. The chalk formation also rises to much more than the average height which it usually attains in England, on the wolds of the East Riding. The

* Memoirs of the Geological Survey of Great Britain, &c., 81 N.W., and 81 S.W., by Edward Hull, Esq., B.A., F.G.S., and A. H. Green, Esq., M.A., F.G.S.: p. 16.

result is that both the East Riding and the North Riding possess the character of hilly regions, in their central ranges, whilst the moors of the North Riding, which are of great extent, in some places rise into lofty mountains. From the same cause the sea-shores of Yorkshire, along the greater part of their course from Redcar, and as far south as Bridlington, are steep, lofty, and precipitous.

Until within the last forty years it was supposed that the riches of the greater part of the North Riding, and of the whole of the East Riding, were confined to their fertile soils, their beautiful coasts, their fine harbours, and their extensive fisheries; and in all those respects Yorkshire ranks amongst the most favoured districts of England. But in addition to these resources, immense mineral wealth has been discovered in the form of rich iron ore, in the Lias formations of the North Riding, during the last fifty years; and as fuel can be obtained in abundance, both by sea and land, and at a moderate cost, from the neighbouring coal-fields of Durham, the North Riding of Yorkshire has become the greatest of the iron districts of England, and the county of York, taking it as a whole, is now the first of English counties in the production of iron, incomparably the most useful and valuable of all the metals. In addition to the discovery of new beds of iron ore almost every year, it has been ascertained that beds of rock salt exist at a considerable depth under the new red sandstone marls, in the neighbourhood of the new port and parliamentary borough of Middlesbrough. Searches for coal have also been made in the neighbourhood of Thirsk and Northallerton. Should these hopes be realized, a still greater impulse would be given to the rapidly increasing prosperity of the North Riding. The want of coal has long been one of the greatest wants of that beautiful country. Previous to the introduction of railways, the farmers, in some districts, had to supply themselves with coals, by sending away their carts and horses after harvest for nearly a week, to fetch their winter stock of fuel; and the poorer classes had to obtain the very slender supplies which they were then able to procure, by buying coal from dealers who came round through the towns and villages with large droves of mules, each carrying a loaded sack of coal. We remember, in our younger days, seeing large droves of mules, laden with coal, driven into the town of Masham and other places on the borders of the moors, for the supply of the poorer inhabitants; and turf and brushwood were then much used wherever they could be obtained. In this respect the

introduction of railways has already made a wonderful change; but the finding of coal at the edges of the new red sandstone would still add greatly to the wealth of the North Riding.

The Great Central Plain of Yorkshire.—A great and fertile plain, extending nearly a hundred miles in length from north to south, and varying in breadth, from east to west, from twenty to thirty miles, runs through the middle of Yorkshire, and gives to its central parts the aspect of a level or gently undulating country. The ancient city of York stands in the middle of this extensive plain, whose many natural advantages probably induced the Romans to make that city the capital of their power in Britain. The great stretch of fertile, well-wooded, and well-watered land, of which the city of York is the centre, is bounded in the distance by the ranges of hills, which the distinguished geologist of the county has divided into four groups; namely, the South-western, the South-eastern, the North-western, and the North-eastern groups. These are subdivisions of the two great chains of mountains which we have already described as running along the eastern and western sides of the county, and as sending out lateral ridges into the interior, down to the edges of the Vale of York.

Passing through Yorkshire from south to north, by the well-frequented line of railway from London to Edinburgh by way of York, it appears to be one of the most level or gently undulating; as well as (what it is in many parts) one of the most fertile, counties in England. On that great plain there is scarcely an elevation of more than 200 feet, from the river Don on the south to the river Tees on the north. Even if entered at the extreme south at Hart-hill, on the borders of Sherwood Forest, the county of York is a comparatively level country as far as the town of Sheffield. That flourishing and populous town lies at the foot of the south-western group of hills, extending along the banks of the Don, the Sheaf, and innumerable smaller streams, to the borders of Lancashire and Cheshire, filling the whole of the south-western district of Yorkshire with groups and ridges of hills and mountains. The sides of the hills and the valleys of this district are covered or dotted with woods and forests of oak, and generally present beautiful scenery, formed by endless varieties of rocky hills and woods, the remains of ancient forests, by grassy vales, and quickly flowing streams. This hilly region extends as far north as the river Calder, and joins the hills round Huddersfield and Halifax. The highest parts of the south-

western chain of Yorkshire hills, form a portion of the Penine range, already described, and rise in Holm Moss to an elevation of 1909 feet.* The greater portion of this range of hills belongs to the Yorkshire coal-field, and is rich in coal, flags, and building stone, which give employment to a large population engaged in numerous branches of industry.

Leaving the south-western range of hills, and following the course of the river Don, past the ancient castle of the Anglian and Norman chiefs at Conisborough, to the town of Doncaster, we again find ourselves in the midst of the plain which extends northward from the Humber to the Tees, and on the south joins the still greater central plain of England. At this point the Yorkshire plain is of great width, and everywhere presents a fertile, grassy, and well-wooded aspect. In advancing northward towards York, the western hills gradually die away in the distance, though a faint outline may be seen in crossing the valley of the Aire, near Knottingley, of the less considerable and more grassy heights on the banks of the river Aire. Near this point the chalk hills of the East Riding are seen to the east, running from north-east to south-west, and forming the lofty district known as the Yorkshire wolds. This range commences on the eastern coast of Yorkshire at Flamborough Head, and forms the eastern boundary of the valley of the Derwent, and of the vale of York. The most considerable heights of the chalk hill range, north of the river Humber, rise from 800 to 900 feet; and the Oolite and Lias hills rise still higher. The chalk hills of the East Riding extend from the sea inland to the banks of the Humber, with the valley of the Derwent and the Yorkshire plain to the west and north, and the great alluvial plain of Holderness, extending from the eastern base of the wolds to the German Sea and the Humber, on the east and south.

Around the ancient city of York the country is very level on all sides, but fertile and well-wooded. Through the great plain in which this ancient city stands flows the river Ouse, and a little to the east of it the river Derwent, which joins the Ouse in the neighbourhood of Howden. The latter river, flowing from the north-west, carries down with it past York the waters of the Swale, the Ure, the Nidd, the Wiske, the Foss, and many smaller streams, flowing from the North or West Ridings; and after passing York it receives the waters of the Wharfe, and the united streams of the Aire and the

* Ordnance Survey Map, 88.

Calder, all of which it discharges into the Humber. The Derwent, on the other hand, brings down a considerable portion of the waters of the North Riding, and a still larger portion of those of the East Riding, all of which are ultimately discharged into the river Ouse, and carried down the Ouse into the Humber.

Proceeding in a north-easterly direction along the plain of York, a third group of mountains is seen rising along the eastern and the northern side of the vale, and extending across Cleveland and the moors of the North Riding to the sea. These are much higher than the hills of the chalk formation, rising at many places to more than a thousand feet, and at the point of greatest elevation reaching a height of 1489. These hills belong to the Oolitic and Lias formations, and during the last fifty years, as already stated, have been found to be the richest iron district of England. The northern tributaries of the river Derwent flow chiefly from these hills, the Ryedale stream being the most important. The river Wiske also flows from the Cleveland hills into the river Ouse; and the rivers Leven and Esk run along their northern base, the one into the sea at Whitby, the other into the river Tees, the northern boundary of Yorkshire.

Proceeding northward over the plains of York and Mowbray to the river Tees, a fourth great group of mountains, loftier and more extensive than any of the above-named ranges, fills the northern and north-western part of the county, extending from the banks of the Tees to those of the Wharfe, and including the greater part of the ancient district of Richmondshire. This range consists, in one part, of the mountain limestone, and in another and more rugged district, of the millstone grit, with its coarse rocks and shales. These districts are rich in lead, lime, and building stone of various kinds. This is a fine pastoral and grazing country, intersected by many of the most beautiful valleys in the north of England, watered by streams abounding in rapids and waterfalls. It terminates to the north and west in dark mountains, of which the highest is Mickle Fell.

In the north-western district of this extensive county is the elevated watershed, from which the Ribble flows out of Yorkshire, through Lancashire, into the Irish Sea. In the same region are portions of the course of the rivers Greta, Wenning, and other smaller streams, which also flow into that sea.

Such is the general aspect of the county of York. But the principal portion of the numerous population of Yorkshire is not

found, either on the great plain of York or amongst these mountain ranges, but in the valleys on the great coal-field of the West Riding, over which flow the rivers Don, Dearne, Calder, and Aire, or in the seaports in the estuary of the Humber, and along the sea-coast. The mode in which the population is distributed in modern times, will be seen in a subsequent part of this chapter.

The Natural Resources and Productions of the West Riding of Yorkshire.—The geology of Yorkshire has been so well described by several of the eminent writers whose researches have had a principal share in founding the modern science of geology, and especially by Professor John Phillips, whose admirable works on this subject have fully illustrated and explained the natural formation of all parts of the county of York, that it will only be necessary to give such a sketch of the various strata, with their soils, rocks, and minerals, as will serve to show what they are, and how great an influence they have had in promoting the various forms of industry existing within the county. It will be seen very clearly, from a recapitulation of these facts, that each portion of the people has been and is diligently employed in developing and turning to the uses of man the rich and varied materials which Providence has placed at his disposal; and that the progress of society in this district, compared with other parts of England, has depended partly on the abundance of the materials placed within the reach of its inhabitants, and partly on the great skill and industry with which they have been developed. All these resources have indeed existed from the earliest ages; but it is only in comparatively modern times that the increase of intelligence has enabled those who had them under their control, to render them available for the uses to which they are now applied. Nor must we suppose that these resources or these uses are even now fully ascertained or developed, for it is only within the present generation that the larger portion of the mineral wealth of the county of York has been discovered, and rendered available; and it is believed that immense mineral wealth still remains undeveloped amongst the strata in this extensive county. Happily, the researches of modern science have thrown so much light on the laws by which the rocks, strata and minerals, existing in every part of the world, have assumed their present positions with regard to each other, as to afford many cautions against error, and many guides to truth, in exploring even the deepest recesses of the earth.

The Rocks and Strata of Yorkshire.—Rocks and strata are now

usually divided by geologists into two great classes—the Aqueous and the Igneous—with a sub-class, consisting of aqueous rocks which have been altered apparently by the action of fire. In the county of York the rocks are almost all of aqueous origin; the igneous rocks found there consisting chiefly of a few thin veins of basalt or of greenstone running through the aqueous rocks. The whole of the igneous rocks existing in the British islands, are found much more fully developed either to the north or the west of this district. In the county of York, or on its borders, commence several aqueous rocks, which cover the greater part of the southern and eastern districts of England, and form the chief corn-growing lands of England.

Yorkshire does not contain the older rocks of the primary or Palæozoic formations, presenting the fossils belonging to the most ancient forms of life, until the rocks of the carboniferous system are reached. Happily, however, it contains the rocks, and minerals, and fertile soils of that system, very largely developed in the form of mountain limestone, and in coal measures, abounding both in coal and iron. Yorkshire also contains the Permian rocks, rich in building stone, which form the most recent of the rocks of the primary period. The secondary or Mesozoic system of rocks, full of the middle forms of animal and vegetable life, it possesses in very great abundance. In this series it has the Triassic rocks and soils; the Lias, the Oolitic, and the Cretaceous systems, rich in earths, favourable to vegetation, and some of them in beds of ironstone. It also possesses in its alluvial soils a considerable development of the Upper Tertiary system.

The Strata existing in the West, East, and North Ridings.—The various strata existing in the county of York are unequally divided amongst the three Ridings of which the county is composed. The West Riding, commencing at its most western point, amongst the Penine mountains, contains the whole series of the carboniferous rocks, namely, the carboniferous limestone, the Yoredale rocks, the millstone grit, and the coal measures. These together fill the larger portion, and cover the whole of the western part, of the West Riding. To the east of the carboniferous formations, for the entire length of the West Riding, the Permian strata form a narrow and strongly marked stripe, on the eastern side of the coal measures. The Permian strata run from the mouth of the Tyne in Northumberland, to the southern bend of the river Trent, at Nottingham, passing

through Yorkshire from north to south, with one or two slight breaks in their course. Further to the east, and forming the eastern portion of the West Riding, is the Triassic formation, better known as the new red sandstone, in many places thickly covered with drift and alluvium. These formations—the carboniferous, with its four great divisions; the Permian, in a narrow band, with the new red sandstone, stretching out into a great plain—together form the strata existing in the West Riding, and have proved the principal sources of its almost extraordinary wealth and industry.

The East Riding commences on its western boundary with the formation with which the West Riding ends, namely, the Trias, or new red sandstone. This is very extensively developed in the East Riding, stretching along the whole of its western side. Next in order is the Lias formation, which in the East Riding is merely a narrow band running from north to south. The Oolitic series is rather more fully developed, but in the East Riding is still not much more than a broad band, although it runs for a very considerable distance, from the sea-shore at Filey Bay, to the neighbourhood of Acklam, on the western border of the East Riding. The greensand and the chalk succeed. These commence in the north of England, with the cliffs of Flamborough Head, and run through the whole of the East Riding to the Humber, the chalk rising into lofty wolds in the middle of the Riding. Next to the chalk are the alluvial beds of the East Riding, stretching out into the German Ocean as far as Spurn Point. Thus the strata of the East Riding differ altogether from those of the West, except as relates to the new red sandstone formation. The other strata, namely the Lias, Oolitic, and especially the chalk and the alluvium, are the characteristic strata of the East Riding.

The strata of the North Riding, which extend entirely across the county, from the Penine mountains to the German Ocean, include the whole of the strata already mentioned as existing in the East and West Ridings, with the exception of the coal measures of the West Riding, and the chalk and the alluvium of the East. The succession of the strata in the North Riding, proceeding from west to east, is as follows:—The mountain limestone, the millstone grit, the Permian, the Trias, and the various branches of the Oolitic formation. The western part of the North Riding contains valuable mines of lead; whilst the eastern part is richer in iron than any other part of England that has yet been explored.

It will be seen from the above particulars that Yorkshire contains a greater number of geological formations and of soils than almost any other English county, and includes in that number most of the soils that are remarkable for their fertility, and most of the rocks and minerals that are of extensive value in the useful arts. The only soil of much value that it does not possess is that which, in England, usually covers the Old Red or Devonian system; and the only minerals not found in Yorkshire are those belonging to the clay slate and the granite. It owes its superiority in this respect, partly to the fact that it is twice as extensive as any other county; but in a great degree also to the circumstance that several strata, which are widely extended in the broader parts of the island, covering the greater part of whole counties, are compressed into narrow parallel bands, in that part of England which includes the two great and populous counties of Yorkshire and Lancashire.

On the western side of the narrowest part of England, formed by the counties of York and Lancaster, the formations cease with the new red sandstone, beyond which they are all concealed by the waters of the Irish Sea. But in Yorkshire a great range of formations still extends eastward, only terminating with the alluvial soils of Holderness. Among these are the soils and formations belonging to the Lias and Oolite series, the cretaceous or chalk formation, and the alluvium with large beds of drift on the eastern coast.

Thus it will be seen that the county of York includes nearly every formation, every mineral, every rock, and every soil, that is of great value for the purposes of industry. The formations which are wanting are either the very early or the very late ones. The only very early formation of much value for agricultural purposes which Yorkshire does not possess, at least to any considerable extent, if at all, is the old red sandstone. And the only portions of the early series which are at all rich in minerals and which are not found in this county, are the clay slates and the granites. Amongst the more recent formations, Yorkshire does not possess the London clay and the Norfolk crag, although the existence of the latter formation has been suspected in the neighbourhood of Bridlington, where, however, if it exists at all, it is rather as a matter of curiosity and scientific interest, than as available for the purposes of industry.

Carboniferous Strata of Yorkshire.—In some recent observations

on the relative ages and the leading physical features and lines of elevation of the carboniferous district of Lancashire and Yorkshire, by that able geologist, Mr. E. Hull, he describes the Penine range as a great arch of carboniferous rocks, bordered on the north and south by a succession of parallel (W.S.W. to N.N.E.) arches and troughs, to all of which he assigns a pre-permian age. He regards them as belonging to the earliest of three consecutive periods of disturbance, to which all the principal flexures and faults of the district may in his opinion be referred. The Penine chain, which runs nearly north and south, he believes to have been upheaved during a later period—namely, the close of the Permian—while the numerous north-west faults of the district under consideration he refers to the close of the Jurassic or Oolitic period.

Immediately on the close of the carboniferous period, the northern limits of the Lancashire and Yorkshire coal-fields were determined by the upheaval and denudation of the beds along east and west lines; the coal-fields themselves retaining their original continuity across the region now formed by the Penine hills, from Skipton southwards. At the close of the Permian period, these coal-fields were dissevered by the uprising of the area now formed of the Penine range, by lines of upheaval ranging from north to south, nearly at right angles to the former, this fact being of itself an evidence of difference of age.

In Mr. E. Hull's opinion, the denudation of the rocks of the district may be referred to seven periods, beginning with the commencement of the Permian and ending with the post-glacial periods.*

In the report in the Memoirs of the Geological Survey of Great Britain and of the Museum of Practical Geology containing the account of the same range of mountains, in illustration of sheets 81 N.W. and 81 S.W. of the map of the Geological Survey of Great Britain, Mr. Hull and Mr. Green have taken much pains to explain the relationship of the "Yoredale series" in Yorkshire, Derbyshire, and Staffordshire; and they have with great care worked out the different members of the "millstone-grit series," which they prove to be nearly 2800 feet thick in Yorkshire, with five thick beds of

* Reports and Proceedings of the Geological Society of London, April 8, 1868. Paper entitled "Observations on the Relative Ages of the Leading Physical Features and Lines of Elevation of the Carboniferous District of Lancashire and Yorkshire," by E. Hull, Esq., B.A., F.R.S., of the Geological Survey of Scotland. Geological Magazine 1868, vol. 5, p. 287.

gritstone—about half of the thickness in Derbyshire—and only about 300 feet thick, with two gritstone beds, in North Staffordshire. They point out that the topmost of these grits, (the “rough rock”), and the third, are continuous throughout; and that each great grit-bed had a coal-seam on its surface, indicating that, in the intervals during which the changes resulting in difference of deposits were being brought about, each grit-bed became for a time a land surface.*

In Yorkshire the carboniferous limestone is overlaid by the millstone grit and the coal measures. It consists chiefly of sea-shells, encrinites, and other organic remains.

The carboniferous rocks are very largely developed in Yorkshire, especially the Yoredale rocks or upper limestone shale, the millstone grit, and the coal measures, the great sustainers of modern industry. Each of the rocks of this series is covered with a soil differing in fertility from that which covers the other rocks of the same series. Hence each of them has its own system of cultivation. Each of them also possesses a different kind of mineral products, including in their number copper, lead, iron, coal, and building stone of many varieties. From this variety of soils there is a great variety in the systems of cultivation adopted on the various soils which cover the limestone rocks, the millstone grit, and the coal measures. Within the series of the carboniferous rocks we find immense varieties in the occupations of the people, and also in the number of persons who are able to find the means of employment, which is only another name for the means of subsistence, on a given area.

The mountain limestone of Yorkshire covers the greater portion of the western parts of the North and the West Ridings. Its general aspect is that of a series of grassy hills, rising occasionally into lofty and rugged cliffs, scars, and coves. It is intersected by numerous streams, flowing down verdant valleys, and occasionally hiding themselves in deep and wide subterranean caves. The general aspect of this district of Yorkshire is pleasing, and the produce both of the soil and of the rocks is very valuable. The land of this formation is generally lofty, usually rising into grassy hills, which are very favourable to the rearing of cattle and sheep, and to dairy produce. The population, like that of all pastoral and grazing districts, is comparatively small: for the plough is the great instrument of industry in the rural districts, and where that is not used extensively employment is scarce.

* Geological Magazine 1866, p. 314.

On the millstone-grit formation the population is still smaller, and, as on the mountain limestone, consists chiefly, in the rural districts, of persons engaged in the breeding and rearing of cattle and sheep. The general aspect of the millstone grit is that of a long succession of wild, heath-covered moors. On this formation the villages are small, and few in number. The towns also are much smaller than the general size of Yorkshire towns, and are chiefly maintained by the attendance of a widely scattered population at weekly markets or yearly fairs, when thousands of people come together, and purchase or sell the cattle, sheep, and other produce of the whole district, in a few days. The principal towns built on the millstone-grit formation are Pateley Bridge, Ripley, Harrogate, Harewood, Otley, Ilkley, Hebden Bridge, and Ripponden, in the West Riding; and Bowes, Masham, and Richmond, in the North Riding.* Some of the towns on this formation have other resources than those yielded by their soil or their minerals, as Harrogate, which is enriched by its mineral waters, and Ilkley, by its delicious cold springs and charming scenery. There are also a few towns on the millstone-grit formation, which owe much to an abundant supply of water-power, and to their proximity to the coal formation. But in general the resources yielded, and the population sustained in that part of the county, generally known as the moors, which stands on the millstone grit, is exceptionally small.

The Agriculture of the Mountain Limestone and Millstone Grit Districts.—The carboniferous or mountain limestone, which constitutes that portion of the western part of the West Riding commonly known as the Craven district, and which is also widely developed in the North Riding, presents a surface of irregular and in many parts of precipitous lines, rising, as it approaches the western range of hills, into mountain chains. It consists almost entirely of grassy pastures, and forms a large portion of that great range of permanent pastures which covers nearly 1,200,000 acres of the territory of Yorkshire. According to the interesting account of the agriculture of this and other districts of the West Riding given in the Prize Report of Mr. John H. Charnock—

“In the neighbourhoods of Bolton Abbey, Skipton, Settle, Giggleswick, Malham, and Sedberg, the prominence of the rocks, contrasting with the fertility and bright green verdure of the numerous valleys, each with its stream running through it, forms

* Geological Map of England and Wales, by A. C. Ramsay, F.R.S. and G.S.

a scene of rich and ever-varying beauty, where the lover of the picturesque may study the effects of light and shade to his eyes' content." The soil is generally thin, lying near to the rock, which at numerous points breaks through it in lofty cliffs and scars. Yet the soil, like nearly all soils lying on a basis in which lime is abundant, is naturally rich, and produces, even on the higher grounds, a herbage that, though short, is sweet and nutritious. The contrast between the pasturage on this and on the sandstone land is so great, as to be perceived, at a considerable distance, by the colour of the herbage. In the valleys the soil is deeper, and by liming and tolerable grazing management has become excellent land. On the lower ground the soil has been enriched by the frequent floods distributing, in solution, the rich properties which the lime possesses. The fertilizing effect of the water issuing from the limestone rocks is very observable, wherever springs break forth. The herbage is far more abundant and brighter in colour. This is seen, amongst other places, in the well-known intermittent spring near Settle, the water of which spreads across a portion of the adjoining land, giving additional richness to the herbage over which it spreads. Even the clefts of the mountain limestone of this beautiful district are full of grasses, flowers, and small pendant trees, planted by nature and not by man, and giving softness and beauty to the wildest precipices. The cattle of this district are light and active, though of the best breeds and of beautiful colours. Sheep are generally found on the higher hills. Throughout the whole of the Craven district much the greater part of the land lies in grass, neither the soil nor the climate being suited for the growth of corn, except in some of the richer valleys. "The district of Craven," says Mr. John H. Charnock, "which comprises the carboniferous or mountain-limestone range, is almost exclusively in grass, the bulk being pasturage of a very superior kind, and the herbage possessing high feeding qualities. On the higher parts of the range are extensive grazings for young stock, which, from the character of the grass, and naturally drier soil than might be expected, and consequently healthy atmosphere, thrive well. The breed of cattle is peculiar to the district, and is easily distinguishable by the long and wide-set horns. The sheep are also of a good size, with black faces and horns. In the more western part of the district, towards the westerland boundary, the country presents such an irregular mass of rocks and moun-

tains, that the valleys alone are accessible to cultivation, and are, in fact, barely sufficient for the wants of the inhabitants. A few flocks of scattered sheep pick up a scanty living on the mountain sides; reminding one of the trite reply of a Yorkshire moorland occupier to that eminent and zealous agriculturist, Sir John Sinclair, who, when visiting some of these moorlands, amongst other questions, asked how many sheep to the acre may usually be considered to be fair stocking: to which the answer was, "Why, mun, ye begin at wrang end first; ye should ax how many acres to a sheep."*

A still wilder and much more barren soil is that of the millstone grit, which covers a considerable district of the more hilly part of the West Riding, and generally presents the aspect of wide heath-covered moors. It extends from the northern extremity of the coal formation, through the centre of the West Riding to Middlesmoor, with an average breadth of about twenty-five miles. There is also a branch of the millstone grit, six or eight miles in breadth, to the west of the coal-fields, extending to the borders of Lancashire by Bingley, Haworth, Heptonstall, and Ripponden, and southward to the neighbourhood of Penistone and Glossop. It is to the west of Harrogate, Ripley, and Masham, that the land begins to rise into the moorlands of this formation. The soil is generally very poor, and it is usually wet from the heavy rainfall on the hills, as well as from the loose nature of the decomposing rock and its great elevation. On the higher portions of the millstone grit there is some peat; but not to so great an extent on this part of the hills as further north and south.

Of the cultivation of the millstone grit Mr. Charnock says, that "like the soil it is generally very poor." He describes the cultivation as consisting of fallow, wheat, and beans, with occasional oats, and here and there a few turnips, which are pulled and given to the cattle in the fold. At Ripley, Otley, and one or two other places, which come more immediately under the personal observation of some of the larger proprietors, better things are certainly met with. Nevertheless there is a wide scope for improvement in the cultivation of inclosed lands and lower levels of this formation. Considering the wetness of the climate, the management of the higher grounds is an example to their neighbours of the lower levels,

* Prize Report, On the Farming of the West Riding of Yorkshire, by John H. Charnock, Esq.: Journal of the Royal Society of England, vol. ix. p. 300.

and proves the capacity even of the higher lands to yield a compensating return under good cultivation.

The Minerals of the Mountain Limestone District of Yorkshire.—The mountain-limestone district of Yorkshire also contains many valuable minerals, including lime, building stone, cobalt, and lead. In the purely rural districts of the limestone formation the population is thin, owing to the scarcity of employment, although a great amount of wealth is produced by a few hands. In the mineral districts the population increases with the means of employment; and in some places, where water power is abundant and coal not very distant, the population of this district is considerable, and increasing. The principal Yorkshire towns in the limestone districts, or on their immediate edge, are Rokeby, Richmond, Reeth, Hawes, Askrigg, Leyburn, Middleham, Settle, Grassington, Malham, Gisburn, and Skipton.* These are all places which may be regarded as centres of rich grazing districts, and some of them also possess considerable mineral resources.

The mineral district of Yorkshire in which lead is produced, extends through the greater part of this formation. We are informed by a writer of great experience, that the lead-mining district of Yorkshire may be defined by an imaginary line drawn from the pleasant watering place of Ilkley, running north-west for a distance of thirty-five miles, and by parallel lines running through points ten miles east and ten miles west from the centre line.† This includes an area of 700 square miles, extending over the mountain-limestone district of Airedale, Wharfedale, Nidderdale, Wensleydale, Arkendale, and Swaledale, in which nearly all the lead mines of the county of York are situated. The strata throughout the whole of this area, like those of the great lead-producing districts of Northumberland, Cumberland, Durham, and Derbyshire, are the lower members of the carboniferous series.

The Lead Mines of Yorkshire.—The ores of this metal are found at upwards of thirty different places in the Yorkshire dales, or in the hills and mountains by which they are bounded. The districts of Yorkshire in which lead is found are as follows, proceeding from north to south:—Swaledale, Arkendale (which is a portion of Swaledale), Wensleydale, Nidderdale, Wharfedale, and Airedale.

* Geological Map of England and Wales, by A. C. Ramsay, F.R.S. and G.S.

† Report on the Lead Mining Districts of Yorkshire, by Stephen Eddy, Carlton, Skipton. Report of the British Association for the Advancement of Science, Leeds, p. 167: 1858.

The lead mines of some of these districts have been worked from the times of the Roman occupation of Britain; several pigs of lead marked with the names of the Roman emperors, and with the mark of the territory of the Brigantes, having been found in this county in modern times. The Swaledale mines were worked in the reign of Henry VIII., and no doubt much earlier.

The following is a tabular account of the lead mines of Yorkshire, and the amount of lead sold by them in the year 1868, from the "Mineral Statistics of the United Kingdom of Great Britain and Ireland, for the year 1868," drawn up from the returns made to Robert Hunt, F.R.S., keeper of the mining records of the kingdom.

TABLE OF LEAD MINES SELLING ORE IN THE COUNTY OF YORK IN 1868.

	Lead Ore.		Lead.		Silver.
	Tons.	Cwts.	Tons.	Cwts.	Oz.
WHARFEDALE—					
Appletreewick,	469	1	304	18	—
Buckden Gavel,	19	5	12	5	—
Burhill,	114	19	79	2	—
Coniston Moor Head,	0	10	0	6	—
Coniston Out-Moor,	21	15	13	9	—
Cracoe and Elbolton,	5	19	4	6	—
Craven Moor or Coop,	32	6	21	0	—
Grassington,	451	2	357	6	—
Grassington Royalties,	39	19	19	2	—
Hebden Moor,	88	12	57	12	—
Old Providence,	192	5	120	10	—
Silver Rake or Brakenthwaite,	0	18	0	10	—
Sharboton Moored, or Wharfedale Mine,	2	16	1	7	—
Sundry Mines,	25	4	6	8	—
AIREDALE—					
Cononley,	270	16	188	14	—
Cowling,	20	5	13	8	—
NIDDERDALE—					
Yorkshire Mine,	90	15	59	0	—
Nidderdale,	26	5	15	15	—
Prosperous and Strong Groves, Sunside (Cockhill),	292	6	190	0	—
SWALEDALE—					
Blakethwaite { Arngill, }	155	0	114	0	—
{ Sun Hush, }					
Arkendale,	1,596	4	1,257	0	—
Old Gang,	2,172	0	1,596	0	—
ARKENDALE—					
Surrender,	57	4	42	18	—
Risdon,	6	15	5	1	—
Hurst or East Swaledale,	704	18	528	13	—
Muher Side or South Swaledale,	233	19	175	0	—
Merrybent,	—	—	—	—	—
Yorkshire Mine,	86	9	64	10	—
WENSLEYDALE—					
Bolton Park,	15	0	10	16	—
Keld Heads,	432	0	340	0	—
Woodhall,	6	11	4	16	—
Askrigg Moor,	12	3	8	0	—
Total of Yorkshire,	7693	16	5654	12	2500

The Strata of the Yorkshire Lead Mines.—We find the following particulars as to the veins in which the deposits of lead are found, in the report on the lead mining district of Yorkshire read before the British Association for the Advancement of Science, at the meeting held at Leeds, 1858, by Mr. Stephen Eddy of Carlton, Skipton. Speaking first of the Grassington mines in Wharfedale, he says:—"The greatest thickness of limestone yet proved at Grassington is sixty-six yards, whereas at the Cockhill mines, near Pateley Bridge, only about six miles distant, it is found to be at least 180 yards thick. In the metalliferous portion of the carboniferous rocks we have the rake vein, the pipe or tube vein, and the lateral embedded or flat vein. The first has the appearance of a rent or fissure in the strata, extending to a great length, and generally to an unknown depth. The second, or pipe vein, has the form of an irregular tube, is met with in certain strata, generally limestone, and dips with the beds, or passes more or less diagonally through them, for a great length. The flat vein is seldom met with, except in connection with some rake vein, but has always a position conformable to the stratum in which it is embedded.

"The rake veins are by far the most numerous in every district, and the phenomena presented by them the most varied and complicated. The greater portion of our lead ore likewise is obtained from them. The longitudinal course, or 'bearing,' of a rake vein is seldom, if ever, a perfectly straight line; but, for the most part, it gives a tolerably direct bearing throughout its entire length. The downward course of these veins varies considerably in the angles formed with the vertical. The 'hade,' or inclination, is likewise more toward a horizontal position, in the soft or argillaceous beds, than in the more hard and solid rocks; and sometimes in passing a seam of coal or of soft clay, it takes the direction of the stratum for a greater or less distance.

"The width of the vein is not uniform throughout its whole length, it frequently opens out from a width of a foot or two, to one of as many yards, and then contracts until it becomes a mere thread or joint.

"At the Cononley mine in Airedale, the vein is frequently found to vary from an inch or two in width, to five or six yards, and that within a longitudinal distance of a few feet. The width of a vein varies also with a change of strata; it is much greater in the hard strata where it has a more erect position than in the

soft; it is generally more open in the limestone than in the gritstone, and very much contracted in the plate or shale. Frequently we find the vein to be four or five feet wide in the grit or the limestone, when it is scarcely perceptible in the plate. The beginning or termination of a vein longitudinally is seldom explored; where this has been done, the vein is found to ramify at acute angles, and the branches quickly terminate.

"A remarkable instance of this occurred at the Grassington mines. In those mines three levels were driven eastward on the Cavendish vein, at the respective depths of twenty, thirty-seven, and fifty fathoms from the surface. The twenty fathom level was in a stratum locally known as the top grit; the thirty-seven, in the 'bearing or main grit;' and the fifty fathom level, in the limestone. Each level was at that time yielding from six to nine tons of rich lead ore from every fathom driven. Many parties who went underground in this mine, after some length of such rich ground had been explored, and while the levels continued to yield at that rate, concluded that ground was being laid open from which immense profits could be made for many years to come, and they were correct, so far as they had an opportunity of judging; for, had the levels continued to open out such rich ground, no difficulty would have been found in making a profit of £40,000 or £50,000 a year from these mines.

"Unfortunately a change soon took place. The first cause for apprehension noticed, was the wedge-like point of thin beds of plate, introduced in different parts of the 'bearing grit' in the thirty-seven fathom level. As these became more numerous, and of greater thickness, the vein began to throw off branches on either side; and in the course of a few fathoms there was not a trace of the vein to be seen. As the upper and lower levels (the twenty and fifty) approached the same perpendicular point eastwards, the vein in each case ramified into numerous strings. First one branch was followed, and then another, until they disappeared entirely. At about sixty fathoms eastward from where all trace of this vein was thus lost, a 'crosscut,' that is, a level at right angles to the general bearing of the veins, was driven to some considerable distance both north and south of where it should have been intersected, had it continued eastward; but without discovering the slightest symptom of a vein.

"The rake veins are generally found to be 'fault veins.' As a

rule, the strata are lower on that side to which a vein 'hades' or inclines, called the hanging wall, than on the one upon which it rests, known as the foot-wall of the vein. Thus a vein with the beds on the north side thrown up, will 'hade,' or underlie, to the south."

The Brimham Rocks.—The wilder moors of the millstone-grit formation, though thinly inhabited, little cultivated, and chiefly visited by the shepherd and the sportsman, present some natural objects of extraordinary interest. Amongst these are the weather-beaten rocks at Brimham, between Harrogate and Ripon, but nearer to the town of Ripley, which are not only objects of extreme interest to the lovers of the grand and the wild in scenery, but are also amongst the most remarkable evidences of the working of those wonderful powers which Providence has employed, and still continues to employ, in forming and changing the aspect of the earth. Various causes have been assigned for the extraordinary diversities of form presented by these Brimham rocks. The following is the latest theory on the subject, formed by an eminent geologist who has turned his especial attention to the action of the waves of the ocean, not only on the existing sea-coasts, but also on the action of the same powers in past times, in districts covered in remote ages by the sea, but now far distant from its waves.

The Brimham rocks are thus described and their origin is thus accounted for by D. Mackintosh, Esq., F.G.S., who has recently published a work on the geological causes which have given to English scenery its present extraordinary variety and beauty of form. He says that amongst the most remarkable objects in Yorkshire are those presented by the Brimham rocks in the West Riding, the remarkable forms of which have hitherto been attributed to the action of the elements, through a long course of ages, or to the hands of man in ancient times; but which he believes to have been produced by the action of the ocean, at a time when the levels of land and sea were altogether different in this part of England. He says that "these rocks are situated about nine miles from Harrogate and Ripon, five from Ripley, and two from Dacre Banks Station. On gaining the summit of the first eminence, the rocks present a very imposing appearance, as they rise up with the sky for a background, and are very liable to be mistaken for an irregular clump of trees on the top of the hill. On approaching nearer, what appeared as one of the trees is seen to be a huge

pillar of rock, with a projection on the left side. On viewing them from a small knoll on the right side of the road, and about three-quarters of a mile distant, the geologist familiar to sea-coast scenery at once looks upon them as the north-west portion of an island which has been partly wrecked by the sea at a former period. A smaller assemblage of ruins may be seen ramifying from the eastern coast of the island; but these are little visited. The Brimham rocks (millstone grit) are of the same nature, and many of them of the same form, as those described by Mr. Hull in the *Quarterly Geological Journal* (August, 1864) as occurring in the Peak district of Derbyshire in groups or multitudinous assemblages. The table shape and anvil shape are common in both localities. Mr. Hull justly calls them 'sea-shore rocks,' and they are due to the same cause, namely, 'old marine denudation.' Ordinary observers are very liable to err in attributing to man what is chiefly or solely due to nature. Many of the cromlechs and most of the rock basins and rocking-stones referred to human workmanship, exhibit the clearest traces of the undermining action of water. It is possible, if not probable, that Druids, or pre-historic Fins, or other races, may have used the Brimham rocks as a temple, and may have increased the resemblance which some of these rocks bear to parts of the human form and other objects. But the evidence that they have been materially altered by human hands is to be sought for in vain. It has been asserted that the marks of tools have been seen on the pedestal of the Idol rock, I have not detected them; but allowing their existence, it would not follow that the general or sea-worn form of this rock was the result of art."*

The point or line of junction of the carboniferous and Permian strata in this part of Yorkshire, has been the subject of a very careful examination by some of the most distinguished geologists of the present age. Professor John Phillips, in one of his many valuable contributions to the knowledge of the geology of Yorkshire, his "Notes on the Geology of Harrogate," says, "Few rocks are more variable in composition, while regular in sequence, than the Lower Permian sandstones and shales. When the sequence is immediate from the upper coal measures to the Permian beds, as in Durham, North Staffordshire, and part of Yorkshire and Derbyshire, the analogy of the two sets of strata is considerable, even if they do not

* Marine Denudations, illustrated by the Brimham Rocks, by D. Mackintosh, F.G.S. *Geological Magazine*, vol. ii p. 155: 1865.

exchange beds. But in this part of Yorkshire the Permian beds are in no sense or manner conformed to the coal system, or any part of it. They are strictly transgressive, and very much so, resting on extremely different members of the great carboniferous system, and of very different age. In this particular district, the millstone grit probably underwent enormous waste after the anticlinal was formed, and before the Permian beds were deposited. These Permian beds of coarse and fine purple sandstone are full of the detritus of millstone grit. The felspar is rolled, but quite recognizable, and the mica appears in ferruginous patches. The rock is quite undistinguishable from millstone grit in hand specimens; even the purple colour (due to decomposed ferruginous mica) fails sometimes; and, as at Plumpton, great and lofty cliffs of solid rock appear, such as may have yielded the Devil's Arrows, those massive monoliths of the British settlement which preceded ancient Isurium. As we proceed to the south, and reach the Leeds coal-basin, the Permian beds lose their similitude to millstone grit; and as we pass to the north and encounter the mountain limestone, so also the resemblance to millstone grit is lost, nor is it recovered in Durham and Northumberland, nor does it occur in any other part of the kingdom, though quartzose pebbles and coarse sand accompany it in many parts. From this we may draw a confirmation of the opinion, very probable on other grounds, that the Lower Permian beds were of littoral aggregation, by currents operating on the waste of the neighbouring coasts."

In a paper by Mr. E. W. Binney on the geology of that part of the country which lies between Bramham Moor and Fountains Abbey, the author observes that he had lately had an opportunity of taking a hasty examination of that part of Yorkshire, for the especial purpose of examining the "Lower Red Sandstone," so carefully described by Professor Sedgwick many years ago, and lately alluded to by Professor John Phillips, in a paper read before the Geological Society. Having of late years devoted considerable attention to the Whitehaven, Astley, and Moira sandstones—rocks lying above all the higher coal measures containing the spirorbis-limestone, on the western side of the Penine chain, and under the soft red sandstone of Permian age, of Collyhurst, near Manchester, and Kirkby-Stephen, and Hilton, and which sandstones very much resemble some of the millstone grits—he was prepared to find the Bramham Moor, Plumpton, and Knaresborough sandstones to

be Permian sandstones; but instead of it he found millstone grit, most probably the upper millstone of Halifax, as described by Professor Phillips, and adopted by the Geological Survey, but more commonly known and described in Lancashire as rough rock, and by Mr. Farey as his "third grit." The districts chiefly examined were the quarries on Bramham Moor, the Plumpton rocks, the rocks lying between the latter place and the escarpment under Knaresborough Castle, and the gritstones and flagstones of the Skell, west of Fountains Abbey.

Mr. Binney states that the rock at Knaresborough contains common coal-plants; it is confined to the millstone-grit district, and has been found in that district alone, and lying upon the same rock; and that it has never been met with in sinking through Permian beds to profitable coal measures like the Whitehaven, Astley, and Moira sandstones; and, although doubtless like those rocks in its characters, it ought not to be confounded with them without further evidence.*

Progress of Population during the present Century in the Districts of the West Riding lying on the Mountain-limestone and Millstone-grit Formations.—Nothing can afford stronger evidence of the great influence which the geological formation of the various strata, of the soils by which they are covered, and of the minerals which they contain, has upon the prosperity of whole nations, and of the districts of which those nations are composed, than a comparison of the different amounts of population and different rates of increase which prevail in districts resting upon different strata. In most countries in which accurate accounts are kept of the amount of the population, and of the rates at which it is increasing in different districts, it is possible to show the degree of influence that is exercised by what are called natural causes; that is to say, by the distribution of the bounties of Providence in different districts. Thus, in a country like that in which we live, where all are under one government, and where intelligence is widely diffused, in all districts, there are great variations in the population, the wealth, the means of employment, which can be clearly traced to what are called natural causes. In the West Riding of Yorkshire, for instance, which we are now describing, we have one rate of increase in the mountainous or lofty region of the

* A few remarks on the so-called Lower New Red Sandstones of Central Yorkshire, by E. W. Binney, F.R.S., F.G.S. *Geological Magazine*, vol. iii. p. 49: 1866.

west partly covered with heath, but chiefly with high-lying grassy pastures ; we have another rate of population in richly cultivated arable districts, where the plough and other instruments of agriculture, which follow in its train, are constantly at work ; whilst we have a third, and altogether different rate of increase, in those districts in which, in addition to the resources furnished by rich pastures and a skilful system of agriculture, there are also the endless sources of employment furnished by abundant supplies of coal and iron, creating the means of generating steam for smelting the metals, and of working them up into every machine or implement which facilitates production or adds to the conveniences of life. In the extensive county of York we find all the forms of society, and all the rates of increase, which exist in any part of England. In portions of the North and West Riding we have thinly-peopled districts, in which the people live by tending cattle or sheep, or by forming the products of the dairy. In the greater part of the East Riding, and in large portions of the West and North, we have a population equal in numbers to the average population of England, maintained by the practice of a skilful agriculture. In a considerable portion of the West Riding we have every mineral that is serviceable in creating modern industry, and almost every branch of industry to which those minerals can be applied. In the latter districts the population is already extremely large, and it continues to increase with great rapidity.

The grazing or pastoral districts of the West Riding, by which are meant those in which pastoral pursuits form the chief sources of wealth and employment, include the census districts or Registration Unions of Sedberg, Settle, Skipton in Craven, Otley, and Pateley Bridge. These districts extend over many hundred thousand acres. They are generally very lofty, consisting of mountains and hills, in some places covered with heath, in others with grass ; and with rich grassy valleys running through them. The census returns which have now been carefully taken every ten years, from the commencement of the nineteenth century to the year 1861, enable us to trace the increase of population in these, as well as all the other districts of Yorkshire, during the first fifty years of the present century, and during the first ten years of the second half of the same century. During the first fifty years, the average increase of population of the whole of England was such as very

nearly to double the population of the kingdom. We mention this to give an easy method of comparing the increase of population in different districts with each other, and with that of the kingdom at large. The following particulars will show the area of each of these districts of the West Riding in statute acres, the amount of the population at the first census of the century, taken in the year 1801; the population and the amount of increase at the middle of the century, as shown at the census taken in the year 1851; and the amount and increase at the last census taken in the year 1861.

The Sedberg District.—This district, which is partly in Yorkshire partly in Westmoreland, is one of the wildest and most mountainous of the districts of the county. It extends over an area of 52,882 acres, of which the town of Sedberg is the principal place. The sub-districts included in it are Sedberg, Garsdale, and Dent. The town of Sedberg stands upon the Silurian rocks, and is surrounded by lofty mountains. Of these the White Fell rises to the height of 2220 feet, whilst the Swarth Fell rises 2250 feet. The greater part of the land included in the Sedberg district belongs either to the Silurian rocks, or the mountain limestone of the carboniferous system. Grazing and pasturage are amongst the chief resources of this wild and lofty district.

At the census of 1801 the Sedberg district contained only 3983 inhabitants. In the fifty years between 1801 and 1851, the population increased from 3983 inhabitants to 4597. In the first ten years of the latter half of the century, between 1851 and 1861, the population slightly decreased, having been returned at 4391 at the census of 1861. This decrease is attributed in the census returns, chiefly to the dying-out of hand-loom cotton weaving at Dent, which it appears had continued in this district up to the year 1851.* The population of the Sedberg district in the year 1851 was at the rate of 55 persons to the square mile, the average population of England at the same time being 332 persons to the square mile.†

The Settle District.—The Settle district is of very great extent, stretching over an area of not less than 154,591 acres, and including the sub-districts of Settle, Bentham, Long Preston, Kirkby-Mal-

* Census Returns of England for 1851 and 1861, and Geological Map of England and Wales, by Andrew C. Ramsay, F.R.S. and G.S., local director of the Geological Survey of Great Britain, and professor of Geology in the Government School of Mines.

† Census Returns, 1851. Number of persons to a square mile in registration districts of England and Wales

hamdale, and Arncliffe. It is in general a hilly, and in many places a lofty and mountainous district, chiefly resting on the mountain limestone, or detached portions of the millstone grit, which is found on the top of Ingleborough, Arncliffe, and some other of the highest points of this district. The valley of Ribblesdale is well watered and fertile, and many of the pastures of this district are very rich. It abounds with beautiful scenery, and with objects of curiosity in its caves and subterranean streams.

The population of the Settle district at the census of 1801 was 11,248 persons. Fifty years later, at the census of 1851, the population of the same district had increased to 13,762. Ten years later, at the census of 1861, the population had slightly decreased, and was returned in the census of that year at 12,528 persons.* In the year 1851, the average population per square mile of the Settle district was 57 persons.

The District of Skipton in Craven.—This beautiful district extends over an area of 150,165 statute acres, and includes a large portion of the finest grazing land in the Craven district, with the upper part of the valleys of the Aire and the Wharfe. The sub-districts of the Skipton district are Skipton, Gargrave, Kettlewell, Barnoldswick, Kildwick, Grassington, and Addingham. The town of Skipton stands upon limestone rock, which is the case with nearly the whole of the Craven district. From the great facility for communication with the more thickly-peopled portions of Yorkshire the population of Skipton district is steadily increasing.

The population of the Skipton district at the census of 1801 amounted to 18,084 persons. In the fifty years which intervened between the census of 1801 and that of 1851 the population increased to 31,274. In the ten years between 1851 and 1861 it still further increased to 31,343 persons.† In the middle of the present century, at the census of 1851, the population of the Skipton district was 123 persons to the square mile.

The Otley District.—This district includes a large portion of the finest part of the delightful valley of the Wharfe; and also extends on the southern side into one of the populous districts of the West Riding. It includes the subdivisions of Otley, Harewood, Fewston, Yeadon, and Baildon. Below Bolton Abbey the river Wharfe flows over the rocks of the millstone-grit formation,

* Census Returns for England, 1851 and 1861. A. C. Ramsay's Geological Map of England.

† Census Returns for England, 1851 and 1861. A. C. Ramsay's Geological Map of England.

through a charming grassy valley, the sides of which rise rapidly into lofty, and, in many places, heath-covered hills.

The Otley district extends over 77,473 statute acres, and in 1801 contained a population of 16,636 persons. This population increased during the fifty years which intervened between the census of 1801 and that of 1851 to 28,644. At the census of 1861 this district was subdivided into the Otley district, containing 43,254 statute acres, with a population of 18,669 persons, and the Wharfedale district extending over an area of 30,798 acres, and containing 15,453 inhabitants, making a total of 34,122 persons. The number of persons to the square mile in 1851 was 237. A small portion of the area was also added to other districts.

The Pateley Bridge District.—The last district which belongs almost exclusively to the mountain-limestone and millstone-grit formation, is that of Pateley Bridge. It is of great extent, covering an area of 67,828 acres. The general aspect of the country is very hilly, and in some places mountainous. Around Pateley Bridge are many valuable lead mines, which create considerable employment, and produce considerable wealth to the district. The sub-districts included in the registration district of Pateley Bridge are, Pateley Bridge, Ramsgill, Thornthwaite, and Dacre Banks.

The Pateley Bridge district, at the census of 1801, contained 5920 inhabitants. In the fifty years which intervened between that time and the census of 1851 the population had increased to 9334. At the census of 1861 the population amounted to 9534 persons.* The population of the Pateley Bridge district at the middle of the present century, in the year 1851, was 72 persons to the square mile.

It will be seen that the mountain-limestone districts and the millstone-grit districts are both of them very thinly peopled, but that there are considerable differences in the amount of population in different portions of the two. It arises chiefly from the fact, that the pastures of the former are much better than those of the latter, and that the former has some valuable minerals, whilst the latter has scarcely any.

The following table will show the amount and progress of population in the grazing or pastoral districts of the West Riding of Yorkshire from the commencement of the present century to the last census taken in the year 1861:—

* Census Returns of England, 1851 and 1861. A. C. Ramsay's Geological Map of England.

PROGRESS OF POPULATION IN GRAZING AND PASTORAL DISTRICTS OF WEST RIDING.

District.	Area in acres.	Population.			Number of persons to square mile in 1851.
		1801.	1851.	1861.	
Sedburgh,	52,882	3,983	4,574	4,391	55
Settle,	154,591	11,248	13,761	12,528	57
Skipton,	150,165	18,084	31,274	31,343	123
Pateley Bridge,	67,828	5,920	9,334	9,534	72
Otley,	77,473	16,636	17,572	18,669	237
Wharfedale,	43,254		14,946	15,453*	

The Coal Formation of the West Riding of Yorkshire.—We pass from the most thinly peopled portion of Yorkshire to the wealthiest and most crowded districts of the West Riding. The chief physical cause of the great contrast in the wealth and population of these different districts, is that the former are almost entirely destitute of fuel, and of the means of sustaining fire and creating steam, the great promoters of modern industry; whilst the latter possess an incalculable and, it is hoped, inexhaustible supply of coal, the remains of primeval forests, stored up within their wealthy strata. Since the invention of the steam-engine, the presence or absence of coal has been the circumstance that has had the principal influence in fixing the amount of employment which each district of England can supply, and the amount of population which it can sustain. It might, in the first instance, have appeared that the discovery of a stupendous power, capable of superseding the strength of men, as well as that of horses and of flowing streams, would have had the effect of superseding the demand for labour, and of narrowing the field of employment; and this may have been the case, so far as relates to the most slavish and the worst remunerated forms of labour. But as relates to every variety of skilled and of well remunerated labour, the discovery of steam, and its application to the propelling of machinery and to other useful purposes, have prodigiously extended the demand for labour, along with the power of production. Thus the large towns and the flourishing villages of the West Riding owe their greatness, and in some cases their existence, to the rich supplies of coal stored up in remote ages, in the recesses of the earth, by a bountiful Providence.

The Formation of Coal.—The circumstances under which the enormous masses of vegetable life that form the coal-fields existing in different parts of the world, were originally produced, were

* England and Wales:—Registration District. Number of persons to a square mile in Registration districts. Census of Great Britain, 1851, vol. i. table 21, p. cxi.

converted into a fossil state capable of resisting the waste of ages, and were deposited in the strata in which they are now found, have long been subjects of discussion amongst the most eminent geologists of this and other countries. In that extraordinary and most interesting review of all the wonders of nature, contained in the "Cosmos" of Alexander Von Humboldt, the various circumstances under which the innumerable plants and trees, whose remains form the coal-beds of modern times, were formed, are very clearly traced. In one point, however, more recent researches, both in England and North America, have greatly shaken the opinion formerly prevalent, that the trees, the canes, the reeds, the grasses, and the mosses found in the present veins of coal, were brought from a distance by the action of the currents of great rivers, and deposited in the strata in which they are now found. It has been clearly shown by Mr. E. W. Binney, and other eminent geologists, that a very large portion of the coal discovered in the north of England and other countries, consists of the remains of vast forests and mosses, which originally grew in the earth beds on which they still lie, and on which they were successively swallowed up and buried by immense masses of sand and clay, since turned by compression into sandstone and shale, by which they are now covered. The question of the manner in which numerous plants possessing all the qualities of the plants grown in tropical regions, were produced in regions in which the present climate is not only temperate, but even intensely cold in the winter months, is explained by Humboldt and others, by the supposition that the earth itself was much hotter in those remote ages than it is in the present times; and that the heat which produced this profuse vegetation was not derived from the solar rays, but from the remains of volcanic fires, still burning under the greater part of the earth's surface. The following extract from the first volume of "Cosmos" contains the views of some of the most distinguished geologists as to the circumstances in which the present coal-fields were deposited, in countries in which every variety of summer's heat and winter's cold now prevails.

"Having thus," says Humboldt, "viewed the series of inorganic formations which compose the crust of the earth in combination with the animal remains interred in them, we have still to consider the vegetable kingdom of the earlier times, and to trace the epochs of the successive floras which have accompanied the increasing extent of dry land, and the progressive modifications of the atmo-

sphere. As we have already remarked, the oldest strata contain only marine plants exhibiting cellular tissue, the Devonian strata being the first in which some cryptogamic forms of vascular plants are found (*Calamites* and *Lycopodiaceæ*). It had been inferred from certain theoretical views concerning the simplicity of the primitive forms of organic life, that in the ancient world vegetable had preceded animal life, and that the former was in fact always the indispensable condition of the latter. But there do not appear to be any facts to justify this hypothesis; and the circumstance that the Esquimaux, and other tribes who live on the shores of the Polar Sea, subsist at the present day exclusively on fish and *Cetaceæ*, is alone sufficient to show that vegetable substances are not absolutely indispensable to the support of animal life. After the Devonian strata and the mountain limestone, we come to a formation in which botanical analysis has recently made the most brilliant progress. The coal measures contain not only cryptogamic plants analogous to ferns and phænogamous monocotyledones (grasses, yucca-like *Liliaceæ*, and palms), but also gymnospermic dicotyledones (*Coniferæ* and *Cycadeæ*). We have already distinguished nearly four hundred species in the coal formation; but of these I will here merely enumerate arborescent *Calamites* and *Lycopodiaceæ*; the scaly *Lepidodendron*; the *Sigillaria*, sixty feet long, distinguished by a double system of vascular fascicles, and sometimes found upright and apparently having its roots attached; the *Stigmaria*, approaching in some respects the *Cactaceæ**—an immense number of fronds and sometimes stems of ferns, which, by their abundance, indicate the insular character of the dry land of that period; *Cycadeæ*, and especially palms, though fewer in number than the ferns; *Asterophyllites*, with verticillate leaves, allied to *Naiades*; and *Coniferæ*, resembling *Araucarias*, having some faint traces of annual rings.

"All this vegetation was luxuriantly developed on those parts of the older rocks which had risen above the surface of the water, and the characters which distinguish it from our present vegetation were maintained through all subsequent epochs up to the last of the cretaceous strata. The flora of the coral formation, comprising these remarkable forms, presents a very striking uniformity of distribution in genera, if not in species, over all the parts of the surface of the earth which were then

* The *Stigmaria* have since been shown by Mr. Binney to be the roots of *Sigillaria*.

existing, as in New Holland, Canada, Greenland, and Melville Island.

“The vegetation of the ancient world presents forms which, by their affinities with several families of living plants, show that in their extinction we have lost many intermediate links in the organic series. Thus, for example, the *Lepidodendra* find their place, according to Lindley, between the *Coniferæ* and the *Lycopodiaceæ*; whilst the *Araucariæ* and the *Pines* present differences in the junction of their vascular fascicles. Even limiting our consideration to the present vegetable world, we perceive the great importance of the discovery of *Cycadeæ* and *Coniferæ*, in the flora of the coal measures, by the side of *Sagenariæ* and *Lepidodendra*. *Coniferæ* are allied not only to *Cupuliferæ* and *Betulinæ*, with which they are associated in the lignites, but also to the *Lycopodiaceæ*. The family of the *Cycadeæ* in their external aspect approach palms, while in the structure of their flowers and seeds they present material points of accordance with *Coniferæ*. Where many beds of coal are placed one above another, the genera and species are not always intermingled, but are more often so disposed that only *Lycopodiaceæ* and certain ferns are found in one bed, and *Stigmaria* and *Sigillaria* in another. To give an idea of the luxuriance of vegetation in the primitive world, and of the immense vegetable masses accumulated in particular places by streams or currents, and transformed into coal, I will notice the coal measures of Saarbruck, where a hundred and twenty beds are found one above another, exclusive of a great number which are not more than a foot thick; and there are beds exceeding thirty, and even exceeding fifty feet in thickness, as at Johnstone in Scotland, and in the Creuzot in Burgundy. In the forests of the temperate zone, at the present period, the carbon contained in the trees which grow upon a given surface would hardly suffice to cover it with an average thickness of seven French lines in a century.”

The circumstances under which plants requiring an intense heat to stimulate their growth, and which at the present time are only found within the tropical regions of the earth, were produced not only in England but in Melville Island, the coldest region existing in the world, are thus explained by the same great writer:—

“Of gaseous emissions, those of carbonic acid are, as far as we yet know, the most numerous and the most abundant. In Germany, in the deep ravines of the Eifel, in the vicinity of the Laachen-See, in the crater-like valley of Wehr, and in Western

Bohemia, exhalations of carbonic acid gas appear as a last effort of volcanic activity, in and near its ancient foci in an earlier state of the globe. With the high terrestrial temperatures of that period, and the numerous fissures which were not then filled up, the processes which we have here described, and in which carbonic acid gas and hot steam mingled in considerable quantities with the atmosphere, must have acted far more powerfully; and then, as Adolphe Brongniart has shown, the vegetable world must have attained everywhere, almost independently of geographical position, the most luxuriant development and abundance.

"In this constantly warm and moist atmosphere, loaded with carbonic acid gas, plants must have found both the stimulus and superabundant nourishment, which prepared them for becoming the materials of those nearly inexhaustible stores of coal, on which the physical power and prosperity of nations are based. Beds of this fuel are accumulated in basins in particular parts of Europe, in the British Islands, in Belgium, in France, on the Lower Rhine, and in Upper Silesia. At the same early period of generally distributed volcanic activity, there also issued from the earth the enormous quantity of carbonic acid, which, in combination with lime, has formed the limestone rocks, and of which the carbon alone, in a solid form, constitutes about the eighth part of their absolute bulk.

"The portion of carbonic acid which was not absorbed by the alkaline earths, but still remained in the atmosphere, was gradually consumed by the luxuriant vegetation, and the atmosphere being thus purified by the vital action of plants, retained only that extremely minute portion which we now find, and which is not injurious to the present condition of animal life. More abundant exhalations of the vapours of sulphuric acid, in the inland waters of the ancient world, appear to have occasioned the destruction of the numerous species of fish and mollusca which inhabited them, and the formation of the contorted beds of gypsum, which have doubtless been subjected to the frequent action of earthquakes."*

In the coal measures, says Mr. A. C. Ramsay, the beds of coal are numerous, and under each bed of coal there is a peculiar stratum which often, but not always, is of the nature of fire-clay. Coal consists of mineralized vegetable matter, chiefly the remains of a fossil tree named *Sigillaria*, and of *Stigmaria*, which Mr. Binney

* Humboldt's *Cosmos*, vol. i. p. 269.

discovered to be the roots of *Sigillaria*. With this are included many other fossil remains. In England the coal measures usually consist of alternations of sandstone, shale, coal, and ironstone.*

The produce of the rich coal-fields of the United Kingdom, which are, however, almost exclusively confined to Great Britain (Ireland being as poor, as England and Scotland are rich, in this description of mineral wealth), now amounts to upwards of 100,000,000 tons every year, and is increasing rapidly with the extension of mining operations. The present yearly supply of coal, if all employed for the purpose of generating steam, would give a power equal to that of many thousand millions of horses, or of a number of men so vast that we can scarcely venture to mention it. But the coal raised on the different coal-fields of Great Britain is applied to a variety of useful purposes; and the manner and purposes to which it is applied have almost as great an influence on the amount of employment and wealth which it serves to create, as the amount of the fuel employed. The principal purposes to which coal is applied are, first, domestic use, in the production of warmth and comfort; second, the exporting of coal to other countries and the British colonies, as an article of merchandise; third, the illuminating of cities with gas; fourth, the smelting of the ores of iron, copper, and lead, and the production of those metals in such a form as renders them useful in the arts; fifth, the manufacturing or forming of railways, iron bridges, iron steam-ships, steam-engines, and machinery of all kinds, and of tools, implements, and the most delicate cutlery; sixth, the effecting of chemical changes and new combinations of substances, as in the cases of alkali, soda, and the numerous and most valuable products of modern chemistry; and seventhly, the generating of steam for the purpose of draining and working mines, of propelling locomotives by railway on land, and steam-vessels on the ocean, and for working machinery employed in the spinning or weaving of cotton, wool, flax, hemp, jute, silk, and every other fibre now used for textile purposes. All these modes of applying the immense amount of fuel produced by the coal-fields of Great Britain, have the effect of creating both local and national wealth, and of giving employment to a large amount of labour. But the amount of employment given to the labouring classes, and also of the public and private wealth accumulated, varies very greatly on the different coal-fields of this and other countries, with

* A. C. Ramsay's *Physical Geography and Geology of Great Britain*.

the various purposes to which the coal raised in those districts is applied. It will be seen from the details given in this and subsequent chapters, that there is no district in England in which the coal produced or imported is applied to a greater number of valuable purposes than in the county of York. It will also be seen that this county, besides possessing large supplies of coal within its own bounds, has during the last thirty years succeeded in obtaining additional supplies from the great coal-field of Durham and Northumberland; and has thus been able to turn to purposes of the highest utility immense masses of iron ore, produced in the North Riding of Yorkshire, whose existence was quite unknown until the present generation, and which would have been comparatively useless even when discovered, if it had not been for the proximity of the great northern coal-field.

All the coal-fields of this county share the advantage of supplying fuel for the purposes of warmth and domestic comfort, and the illumination of cities and towns, not only within their own limits, but in extensive districts and to large populations which are destitute of fuel. The introduction of steam as a motive power, both on railways and along our own coasts, and even on the shores of distant countries, has had the effect of adding immensely to the means of communication by sea and land, and to the power of locomotion. For many ages the inhabitants of London have obtained their supplies of fuel from the coal-field of Northumberland and Durham, which lies close to the sea, and possesses every facility both for a great coasting and a great foreign trade, even in this cheap and bulky article. But it is one of the most remarkable proofs of the facilities created by steam-power and by railways, that coals are now being conveyed by land from Yorkshire to London, a distance of 200 miles, and are able to compete with coals conveyed by water carriage. On all the coal-fields of England the practical range of sale and consumption has greatly increased since the introduction of the railway system, and this has joined with the increase of the local population to give a great impulse to this most valuable branch of national industry.

Whilst all the coal-fields of the kingdom are used to supply fuel for domestic purposes and to enliven our streets, a very large portion of their produce is also used to furnish the means for smelting iron, copper, lead, and other ores, and for the working of the metals thus produced. This is especially the case on the Staffordshire and

Worcestershire coal-fields, on those of Shropshire, Gloucestershire, Monmouthshire, South and North Wales, and the West of Scotland. It has also become the case within the last thirty or forty years on the coal-fields of Durham and Northumberland, which, beside furnishing fuel to smelt the lead and iron ores of those two counties, are used for the same purpose in the great iron district of Cleveland or North Yorkshire. A certain portion of the coal of the West Riding is also used for the smelting of the very fine class of iron ores found in that district.

But the great characteristic use of the coal supply of Yorkshire, like that of Lancashire, Cheshire, Derbyshire, and Nottinghamshire, is the generating of steam to be used in impelling the machinery by which the great textile manufactures of this country are produced. In the year 1868 there were in the United Kingdom 6403 manufactories employed in spinning and weaving cotton, wool, flax, hemp, jute, and silk into manufactured goods. In these factories there were at that time no less than 11,100 combing machines, 40,993,244 spinning spindles, 2,975,626 doubling spindles, 546,619 power looms worked by 247,286 power-loom weavers, 1,148,561 billy spindles, 1403 condensers, 2784 gigs, and 3981 fulling stocks. The amount of moving power for working this prodigious quantity of machinery was 336,730 horse-power, supplied by steam generated by coal, and 29,320 horse-power supplied by water. The number of persons employed in the whole of these factories was 330,699 males, and 523,544 females, making a total of 854,243 persons. The yearly value of all the products of the industry and skill produced in these great industrial establishments is at least £150,000,000 sterling. The portion of these products manufactured in the county of York, is probably from one-fourth to one-fifth of the whole. The number of factories of all kinds existing in the county of York in 1868, was 1896; the number of combing machines was 2165; the number of spinning spindles was 6,067,868; the number of doubling spindles was 1,052,855; the number of power looms was 88,591, worked by 65,047 power-loom weavers; the number of billy spindles was 1,008,118; of gigs, 3849, and of fulling stocks, 3309. The amount of moving power supplied by steam was 72,767 horse-power, and by water 5139 horse-power. The number of the male population employed in the factories was 92,290, and the number of the female was 133,252, making the total of male and female 225,542. All the particulars with regard to these vast

trades will be found in other chapters of this work. These few general results are mentioned here, to show how vast an amount of employment and production depends upon the steam-power supplied by the coal-field of Yorkshire.*

Yorkshire is one of the English counties which are the most enriched by the possession of extensive beds of coal. The produce of the Yorkshire coal-field at the present time is about 10,000,000 of tons per annum, and it is with the immense mass of fuel thus furnished by the mineral strata of the county, and with the fire and steam produced from it, that the chief branches of the industry of the county are conducted. The following account of the number of collieries in Yorkshire, and the manner in which they were distributed through the West Riding in the year 1868, with the produce of each district in the same year, is supplied by Frank N. Wardell, Esq., the inspector of coal-mines in the Yorkshire district, to the official returns of the "Mineral Statistics of the United Kingdom of Great Britain and Ireland," published in 1869:—

THE COLLIERIES OF YORKSHIRE AND THEIR PRODUCE, 1868.

MR. FRANK N. WARDELL, Inspector.

No. of Collieries.	Coals Produced. Tons.
6, Bingley,	41,250
42, Barnsley,	1,799,500
50, Bradford,	1,175,270
34, Dewsbury,	395,850
33, Halifax,	450,500
36, Huddersfield,	300,500
13, Holmfirth,	87,470
102, Leeds,	2,505,000
4, Normanton,	
5, Penistone,	75,000
6, Pontefract,	
23, Rotherham,	570,250
35, Sheffield,	1,075,500
49, Wakefield,	1,258,470
3, Saddleworth and Settle,	5,450
441	Total produce of Yorkshire, 9,740,510

Before we proceed to give a fuller account of the Yorkshire coal-field, it may be well to bring before our readers the last official return of the produce of the whole of the coal-fields of the United Kingdom, as shown in the same official returns.

* *Factories*.—Return of the number of Cotton, Woollen, Worsted, Flax, Hemp, Jute, Horse Hair, Elastic Hosiery, Lace, and Silk Factories, subject to the Factories Acts in the United Kingdom, moved by Mr. Baines, 22nd July, 1868. No. 453.

SUMMARY OF COAL PRODUCE OF THE UNITED KINGDOM FOR 1868.

	Tons.
Durham and Northumberland,	24,394,167
Cumberland,	1,378,026
Yorkshire,	9,740,510
Derbyshire,	4,957,879
Nottinghamshire,	1,508,439
Leicestershire,	608,088
Warwickshire,	624,859
Staffordshire and Worcestershire,	12,294,780
Lancashire,	12,800,500
Cheshire,	937,500
Shropshire,	1,495,500
Gloucestershire and Somersetshire,	1,969,000
Monmouthshire,	4,250,500
South Wales,	8,959,500
North Wales,	2,385,000
Scotland,	14,709,959
Ireland,	126,950

Total produce of the United Kingdom, . . . 103,141,157

The workable coal-field of Yorkshire may be said to commence northward on the northern side of the valley formed by the river Aire. The town of Bingley, and Potternewton, near Leeds, may be considered the two northern points of this coal-field, according to the geological map published by Mr. A. C. Ramsay, one of the local directors of that survey. The extreme breadth of the Yorkshire coal-field at its northern extremity is from Wilsden, some miles to the west of Bradford, to Garforth near Leeds. To the north and west the coal-field is bounded by the millstone grit, and to the east by the conglomerate sandstone and red marls of the magnesian formation. These formations bound the Yorkshire coal-field from its extreme northern to its extreme southern point. The total length of this coal-field, within the limits of the county of York, is from thirty-five to forty miles; that is to say, from Potternewton, near Leeds, to the neighbourhood of Sheffield, or from Bingley to the same place. The extreme breadth is about twenty-five miles; that is, from Halifax or from Huddersfield, to the most easterly coal-mines between Normanton and Pontefract. Within the limits thus described are included the greater part of the mineral riches and the manufacturing wealth of the West Riding. The towns on this portion of the Yorkshire territory are amongst the largest and wealthiest in England; and the means of employment which they afford to every description of labour, and every exercise of ingenuity and skill, are so great that it is impossible to fix any

limit to their future progress. Amongst the towns on the coal formation of Yorkshire are Leeds, Bingley, Keighley, Bradford, Halifax, Dewsbury, Elland, Wakefield, Huddersfield, Batley, Barnsley, Penistone, Rotherham, and Sheffield. All these places are rapidly increasing, and in this district, at every census, places which had previously been described as villages, rise above the minimum population of 2000, which now constitutes a town, and are returned amongst the towns of England.

The geological survey of the coal-field of Yorkshire is now in progress, or rather the publication of the results of that survey, by the eminent geologists who are acting with the Board of Ordnance. We have already a good outline of this survey in the geological map of England and Wales, recently published by Andrew C. Ramsay, F.R.S. and G.S., local director of the Geological Survey of Great Britain, and professor of geology in the Government School of Mines. We have also some of the maps of the more southern parts of the Yorkshire coal-field, and a very interesting account of the sinkings made through the Permian strata at Shireoak, on the borders of Nottinghamshire and Yorkshire. The result of these sinkings was the discovery, at a depth of about 1500 feet, of the great and rich coal-beds generally known as those of Barnsley, and of numerous beds of coal above that great stratum. The following particulars are supplied in the memoir of the geology of parts of Nottinghamshire, Yorkshire, and Derbyshire, to illustrate the quarter sheet, number 82 N.E. They are from the pen of Mr. W. Talbot Aveline, F.G.S., and accompanied with lists of fossils by J. W. Salter, F.G.S.

This memoir states that the coal measures of this district form a small portion of the eastern border of the Yorkshire coal-field. Although none of the thick coal-beds of the south Yorkshire coal-field come to the surface here, they, or many of them, must lie below, but at a considerable depth. It was from the knowledge of this superposition of the strata, coupled with good geological measurements and calculations, that that public-spirited and most intelligent nobleman, the late duke of Newcastle, undertook the important enterprise of sinking two pits in his property at Shireoak, under the superintendence of Mr. John Lancaster. The sinkings were commenced in March, 1854, and after meeting with considerable difficulties, the first thick coal of four feet six inches, and of good quality, was cut at a depth of 346 yards. This coal is

supposed to be the Wathwood coal of the Derbyshire and south Yorkshire districts. On the 1st of February, 1859, the "top hard coal" was reached at a depth of 510 yards. This well-known coal, generally called the "Barnsley coal," was the one sought after; and the fact that the calculations of Mr. Lancaster agreed within a few feet with the actual depth, reflects great credit on his geological knowledge and mining skill.

Sinking of the Shireoak Mine.—In sinking the Shireoak mine, and in the operations connected with it, the total depth reached or proved by borings was 547 yards. After sinking through the Permian marls and sandstone to a depth of 18 yards, 2 feet 6 inches, the strata encountered were as follows:—Yellow limestone, 18 yards, 2 feet 8 inches; grey limestone, 15 yards, 1 foot; blue shale and rock, 6 yards, 2 feet 3 inches; blue shale, 11 yards, 9 inches; sand-rock, 1 foot 8 inches; warren earth, 1 yard; blue and red bands with ironstone, 1 yard, 2 feet 11 inches; ironstone, 1 foot 4 inches; black shale, 2 inches; shale and rock, 10 yards; the manor coal, 2 feet; blue shale, 5 yards; grey and red rock, 66 yards. This rock is believed to represent the Rotherham red rock. The base of this rock was found at a depth of 156 yards, 2 feet 3 inches below the surface.

The succession of the strata in the Shireoak pit, from the gray and red rock (believed to represent the Rotherham red rock) to the hard or Barnsley coal, was as follows:—

STRATA IN THE SHIREOAKS PIT.

Description of Strata.	Thickness.			Depth.		
	Yds.	Ft.	In.	Yds.	Ft.	In.
The Manor coal,	0	2	0	85	2	3
Blue shale,	5	0	0	90	2	3
Grey and red rock,	66	0	0	156	2	3
Coal,	0	1	4	157	0	7
Rock and shale,	13	0	8	170	1	3
Black shale,	0	2	6	171	2	9
Fire-clay,	2	0	2	173	2	11
Coal and black shale,	0	1	4	173	2	3
Shale,	3	2	10	177	2	1
Coal,	0	1	4	178	0	5
Fire-clay,	2	1	3	180	1	8
Shaly coal and ironstone, 4 inches,	0	1	6	181	0	2
Shale,	5	2	3	186	2	5
Coal,	0	0	9	187	0	2
Fire-clay,	0	2	7	187	2	9
Shale and coal,	0	1	0	188	0	9
Rock,	2	2	4	191	0	1
Coal,	0	0	8	191	0	9

STRATA IN THE SHIREOAKS PIT (*Continued*).

Description of Strata.	Thickness.			Depth.		
	Yds.	Ft.	In.	Yds.	Ft.	In.
Blue shale,	6	0	8	197	0	9
Shaly coal,	0	0	3	197	1	0
Rock and metal,	8	2	4	206	0	4
Coal and black shale,	0	1	11	206	2	3
Shale,	1	2	9	208	2	0
Rock bands,	10	2	3	219	1	3
Black shale and ironstone, 5 inches,	4	0	4	223	1	7
Fire-clay and shale,	2	2	0	226	0	7
Coal,	0	1	2	226	1	9
Shale and rock,	5	1	0	231	2	9
Coal,	0	0	4	232	0	1
Shale and rock,	3	0	4	235	0	5
Coal and shale,	0	0	6	235	0	11
Shale,	3	0	5	238	1	4
Bands of rock,	10	2	4	249	0	8
Shale and ironstone bands,	10	2	6	260	0	2
Shale,	8	1	2	268	1	4
Coal,	0	0	8	268	2	0
Rock and shale,	8	0	7	276	2	7
Coal,	0	1	0	277	0	7
Rock and shale,	23	1	10	300	2	5
Coal,	0	0	7	301	0	0
Shale and ironstone,	16	2	0	317	2	0
Inferior coal,	0	1	2	318	0	2
Shale,	7	1	6	324	1	8
Coal,	0	0	5	324	2	1
Rock and shale,	15	0	0	339	2	1
Shireoaks, Melton clown, or Wathwood coal,	1	1	4	340	0	5
Shale,	18	1	0	358	1	6
Inferior coal,	1	0	2	359	1	8
Warren earth,	1	1	6	361	0	2
Strong rock,	4	0	5	365	0	7
Measures, (with thin beds of coal),	15	0	5	380	1	0
Furnace coal,	2	8		381	0	8
Measures,	8	0	1	389	0	9
Coal,		1	6	389	2	3
Fire-clay,	0	1	4	390	0	7
Coal,	0	1	0	390	1	7
Shale and rock,	13	2	8	404	0	3
Coal,	0	2	1	404	2	4
Shale and rock,	3	2	9	408	2	1
Coal,	0	0	6	408	2	7
Shale and rock,	18	2	3	427	1	10
Hazles coal,	1	0	1	428	1	11
Dirt in coal,	0	0	7	428	2	6
Rock and shale,	10	2	2	439	1	10
Shell bed,	0	0	2	439	1	18
Shale,	19	2	3	459	1	1
Coal,	0	1	4	459	2	5
Shale and rock,	42	2	1	502	1	6
Coal,	0	0	7	502	2	1
Shale,	5	0	7	507	2	8
Hard coal,	1	0	9	509	0	5
Dark warren earth,	0	0	3	509	0	8
Blue shale,	2	1	6	511	2	2
PROVED BY BORING.						
Rock and shale,	14	1	4	526	0	6
Coal and shale,	0	0	7	526	1	1

STRATA IN THE SHIREOAKS PIT (*Continued*).

Description of Strata.	Thickness.			Depth.		
	Yds.	Ft.	In.	Yds.	Ft.	In.
Blue shale and ironstone bands,	11	0	0	537	1	1
Ironstone,	0	0	7	537	1	8
Rock and shale,	8	1	5	546	0	1
Black shale,	0	2	5	546	2	6
Warren earth,	0	1	2	547	0	6

The following are the points of greatest interest proved by this unusually deep sinking:—1. The existence of a soft sand rock at the bottom of the Permian beds in this district, which seems to be the equivalent of the quick sand of the North. 2. The absence of any workable seam of coal in this district, at least in the 340 yards of coal measures above the Wathwood or Shireoak thick coal. Thirty-seven feet of coal were passed through in the sinking, but only four seams were of a workable thickness. 3. The existence of a red ironstone in the upper measures, which promises to be of great value. 4. The top hard coal seemed to thin out towards the east, under the magnesian limestone; for at Killamarsh and near its outcrop, six miles west of Shireoaks, it is six feet thick, whilst there it is only three feet nine inches.

The Wathwood coal being found within one yard of the depth calculated upon, from the dip of the strata, would lead to the supposition that the new district is remarkably free from faults; and this supposition is still further borne out by the large bodies of water met with. The dip decreases considerably towards the east, the strata coming more into a basin-form. On examining the section of the Shireoaks pit it will be seen that the coal measures are made up of numerous beds of sandstone rock, shale, clay, ironstone, and coal. Few of the softer beds of the coal measures are exposed at the surface of this district. The nearest good section is that exposed in the cutting of the Manchester, Sheffield, and Lincoln Railway, just without the western border of the quarter sheet, 82 N.E., where may be seen sandstone, clays, and thin beds of coal, like those mentioned in the pit's section. It appears from these researches that the soft grindstone beds are in the coal measures. Besides being used for grindstones the soft sandstones are worked into cisterns, troughs, and pillars. The best exposures of these

beds are in the quarries near Wickersley, west of this district, in which are found the common coal-measure fossil plants.*

The Working of the Yorkshire Coal-mines.—The official returns of the inspectors of coal-mines laid before Parliament, throw much light on the working of the Yorkshire coal mines, from the year 1852 to the present time. During much the greater portion of that time the Yorkshire coal-mines were inspected by Mr. Charles Morton, who seems to have spared no pains in urging and encouraging the adoption of every means which could avert accident, and secure the safety of the very valuable, but not very provident class of workmen, who spend their lives in working those mines. Since the retirement of Mr. Charles Morton, the inspection of the Yorkshire mines passed into the hands of, first, Mr. Southern, and afterwards of Mr. Frank Wardell, who holds that important office at present; both of whom have laboured assiduously to insure the same objects. A few notes from these reports will throw light, both on the nature of the Yorkshire coal-field, and of the circumstances under which it is worked.

In Mr. Charles Morton's Report for the year 1852, he stated that the number of coal-mines in Yorkshire at that time was 265. He further stated that the Yorkshire coal-mines, though very numerous, were in general shallow and of a small area, many of them being less than 100 yards in depth, and few exceeding 250 yards. The beds of coal were numerous and of very different degrees of thickness; the thinnest being about eighteen inches, and the thickest ten feet. In subsequent reports he mentioned that the Sheffield seam of coal was more than five feet thick, at a depth of 160 yards; at the Warrendale colliery, near Rotherham, there was one bed of coal nine feet thick, and another five feet; that the Barnsley coal was nine and a half feet thick, and at the lower Elsecar colliery, near Barnsley, was found at a depth of 164 yards.

With regard to the Yorkshire collieries Mr. Morton states in his Report of 1852, that some of the coal strata contained much fire-damp, others much choke-damp; that some were liable to spontaneous combustion and gave off mixed vapours, and that a few of them were nearly free from gas. From the various nature of the coal-beds and of the roof and floor, it had been necessary to adopt different plans of mining. The pillar and stall method

* Memoirs of the Geological Survey of Great Britain, &c. 82 N.E. 1861.

of excavating the mines so generally adopted in the county of Durham was not much used, nor the long-work system which prevails in the midland counties; but a modification of the two systems was adopted in Yorkshire. The contrivances for supporting the roofs of the mines were also various. In some collieries wooden props were employed; in others piles of wooden blocks assisted the props; whilst in a third class of pits portable iron props were used.

In the year 1855 Mr. Charles Morton reported that the collieries in Yorkshire were more than 300 in number. In 1857 he stated that the number of the Yorkshire collieries had increased to 343. He also stated that the quantity of coal drawn from these collieries was 7,750,000 tons, and that the number of lives lost in gaining that quantity of coal was sixty-six, being at the rate of eight and one-sixth to each million ton of coals.

In February, 1857, there occurred the greatest and most terrible accident that ever was known in the coal-mines of Yorkshire, namely, that caused by the explosion of fire-damp at Lundhill Colliery, near Barnsley. It appears from Mr. Charles Morton's report for 1858, that the Lundhill Colliery is between the villages of Wombwell and Elsecar, about five miles S.E. from Barnsley. The pits were sunk on the north-eastern and dip-side of the Rotherham and Barnsley coal-field, and were almost the deepest in South Yorkshire. The workable seams at Lundhill were stated to be the Wathwood, at a depth of about forty feet, and nearly four feet in thickness; the Abdy, about seventy-five yards in depth, and nearly three feet thick; and the Barnsley coal, about 214 yards deep, and from seven three-fourths to eight feet thick. In the evidence respecting the Lundhill accident, Mr. Nicholas Wood, of Hatton, one of the most experienced mining surveyors in England, said that there was no difficulty whatever in Durham and Northumberland about using safety lamps; that coal-mining in Yorkshire was becoming dangerous, as the pits were sunk deeper; and that unless naked lights were excluded, there would be frequent accidents. The number of lives lost in the Lundhill accident was stated by Mr. Morton to be 187. The effect of this accident was to swell the number of deaths in the Yorkshire coal-mines in the year 1857 to 245, being much the greatest number ever known.

In the report for the year 1857 Mr. C. Morton stated, that

the number of coal-mines in the Yorkshire district was then 383, and that Yorkshire at that time produced the eighth part of the coal raised in England. In the year 1860 Mr. Morton reported that the quantity of coal drawn in Yorkshire that year exceeded eight and a half millions of tons, and that the number of persons killed in the collieries of that county in the same year was fifty, or in the ratio of one death to every 170,000 tons of mineral raised.

In the report of 1861 Mr. Morton entered somewhat more fully into the history of coal-mining in Yorkshire during the preceding ten or eleven years. He stated that the number of working collieries in Yorkshire had increased during the preceding eleven years from 260 to 390 (being an increase of fifty per cent); and although the quantity of coal produced during the same period had advanced from 6,750,000 tons to 9,750,000 tons, being an increase of thirty-seven per cent, yet the number of deaths in the Yorkshire coal-mines had diminished from 106 in the year 1851 to fifty-eight in the year 1861, being a decrease of forty-eight per cent.

Unfortunately the number of deaths was considerably greater in 1861, amounting to 115. But the year 1863 was comparatively a favourable year, although the number of deaths in 1863 was forty-eight in the Yorkshire coal-mines, to which were to be added five in ironstone mines, and two in experimental or trial shafts. According to a statement of Mr. Morton in this year's Report, the number of lives lost annually in the Yorkshire collieries, excluding those lost in ironstone mines and new sinking pits, were 106 in the year 1851; 61 in the year 1852; 51 in the year 1853; 64 in the year 1854; 66 in the year 1855; 52 in the year 1856; 245 in the year 1857 (the year of the Lundhill Colliery explosion); 47 in the year 1858; 63 in 1859; 50 in 1860; 55 in 1861; 104 in 1862; and 48 in 1863.

In the year 1867, Mr. Charles Morton was compelled by ill health to resign the office of inspector of coal-mines in Yorkshire, and in the succeeding year the Report of the Yorkshire mines was made by George William Southern, Esq., the present inspector of mines in the Northumberland, North Durham, and Cumberland district. His report on the Yorkshire mines is for the year ending the 31st December, 1867. In the following year Frank N. Wardell, Esq., was appointed inspector of the Yorkshire district, and his Report, published in the course of the year 1869, is the last of the

series. It appears from Mr. Southern's Report that the number of deaths in the Yorkshire coal-mines in the year 1867 was ninety, and that the number in 1868 was eighty. In Mr. Wardell's first Report, dated Pontefract, 27th February, 1869, he states that he had much satisfaction in being able to report a diminution in the number of accidents by seven, as compared with the year 1867, resulting in a reduction of eleven in the number of deaths. He adds that there was, at the same time, an increase in the number of collieries, those opened out during the past year being in excess of those worked out, or for other reasons closed. Several were still "winning." That the total quantity of coal raised was less than that of the preceding year by nearly 150,000 tons was, Mr. Wardell said, owing chiefly to the general depression of trade in the year 1868. The total produce of coal in the United Kingdom during the year 1868 was 104,600,000, and the number of lives lost 1011, or one life lost per 103,461 tons. In the Yorkshire district the total produce of the coal-mines in 1868 was 9,705,000, and the number of lives lost eighty, or one life lost for 120,312 tons. This comparison, Mr. Wardell observes, is very favourable to Yorkshire.*

General View of the Yorkshire, Derbyshire, and Nottingham Coal-field.—The Yorkshire coal-field also extends over a considerable portion of the adjoining counties of Derby and Nottingham, the coal-fields of those three counties being physically one, though separated by political divisions. Taking it as a whole, it is the largest coal-field in England, though about 150 square miles smaller in area than the great coal-field of South Wales. The extreme length of this coal-field, from the river Aire on the north to the river Trent on the south, is 66 miles, and its breadth varies from 5 to 20 miles, the total area being 760 square miles. The middle coal measures of this coal-field are 2500 feet thick; the lower coal measures or gannister, 1000 feet thick. The Black Shale coal represents the Arley mine of Lancashire, and the Kilburn coal and the Low Moor coal of Yorkshire are nearly identical. The lower beds of the ironstones are very valuable.

The succession of strata in the Barnsley district, which may be taken as a good specimen of this coal-field, is stated by Mr. Edward Hull and the Rev. W. Thorpe to be as follows:—Magnesian lime-

* Mines.—Reports of the Inspectors of Mines to Her Majesty's Secretary of State for the year 1868; London, 1869. Report on the Inspection of Mines in the Yorkshire District for the year ending the 31st December, 1868, by Frank N. Wardell, Esq., page 147.

stone, 75 feet; Lower Permian sandstone, 54 feet; Ackworth rock, 54 feet; strata, 510 feet; Shafton coal, 5 feet; strata, principally sandstone (Chevit rock), 393 feet; Muck coal, $3\frac{1}{2}$ feet; strata, 219 feet; Woodmoor coal, 3 feet; strata in half yard coal, 45 feet; Winter coal, 4 feet; strata, Beamshaw coal, 3 feet; strata with Kent coal, 1 foot, and Mapple coal, $4\frac{1}{2}$ feet (inferior quality); strata, 216 feet; Barnsley coal, $9\frac{1}{4}$ feet; strata, 198 feet; Swallow Wood coal, 3 feet; strata, 234 feet; Joan coal, 2 feet; strata, 60 feet; Flockton top coal, $6\frac{1}{4}$ feet; strata, 120 feet; Parkgate coal, 5 feet; strata, 78 feet; Thorncliffe thin coal, $2\frac{1}{2}$ feet; strata, 123; Four feet coal (variable), $2\frac{1}{2}$ feet; strata, 108 feet; Silkstone coal, 5 feet; strata, 195 feet; Whinmoor, or Lowmoor, $2\frac{1}{2}$ feet; strata (about), 150 feet; gannister flagstone (about), 36 feet; strata, principally shales, 495 feet; Halifax coal, $1\frac{3}{4}$ foot; strata (shales and flags), 81 feet; Halifax soft coal, $1\frac{1}{2}$ foot; strata, 150 feet; millstone grit.* In the veins of coal, the most valuable are the Silkstone and the Barnsley thick coals. The former is said to be identical with the Arley mine of Lancashire, and thus this fine bed of coal, which seldom exceeds five feet in thickness, has spread over a tract embracing not less than 10,000 square miles.

The quantity and duration of the workable seams of the middle coal measures in this coal-field is estimated by Mr. Edward Hull to be as follows:—The average number of workable beds of coal above two feet, 15; giving a vertical thickness of 46 feet of coal. The original quantity of coal (corrected for denudation), 17,656 millions of tons; deducting one-fourth for the quantity worked out, and one-fourth for waste, we obtain for future use 8,828 millions of tons. This at the rate of consumption of $12\frac{1}{2}$ million tons yearly, would last 705 years. In addition to this, there is an area of about 400 square miles overspread by Permian (Magnesian limestone) and Trias, under which several of the workable beds of coal lie at a smaller depth than 4000 feet. These are estimated to contain 12,390 millions of tons of coal, which, added to 8,828 millions of tons already given, would make the total quantity of coal, at a depth of less than 4000 feet deep, 21,215 millions of tons, a quantity sufficient, at the present rate of consumption, to last about 1500 years.†

* The Coal-fields of Great Britain, their History, Structure, and Duration, by Edward Hull, Esq., M.A. of the Geological Survey of Great Britain; Fellow of the Geological Society of London, 1861.

† The Coal-fields of Great Britain. E. Hull, B.A., Esq., page 131.

Amount and Increase of Population in the Coal and Iron Districts of the West Riding.—The coal and iron district of the West Riding is subdivided into fifteen districts, in the returns made by Mr. Frank N. Wardell, inspector of coal-mines in the Yorkshire district. The names of these fifteen colliery districts are as follows—the Bingley, the Barnsley, the Bradford, the Dewsbury, the Halifax, the Huddersfield, the Holmfirth, the Leeds, the Normanton, the Penistone, the Pontefract, the Rotherham, the Sheffield, the Wakefield, the Saddleworth and the Settle districts. These districts do not exactly correspond in extent of area with the districts employed in taking the decennial census; but they agree sufficiently to enable us to show how great an influence the mineral wealth of each district has on the numbers of its population, and on the rate at which that population has increased during the present century. Rich beds of coal are found in all these districts, but the number of coal-mines varies very greatly, and the number of iron-mines also. It may be stated in general terms, that the population of the whole of these districts is very much above that of the average population of districts of equal area throughout the kingdom; and also that the population of the whole of those districts is increasing much more rapidly than the average population of England. But in the different districts of the coal-field of the West Riding there are great differences both in the amount of the population per square mile, and in the rate at which the population has increased during the present century. Various causes no doubt combine to produce this variety of results; but it may very safely be stated that amongst the most powerful of those causes have been the amount of mineral wealth existing in each of them; the extent to which that mineral wealth has been developed; and also the uses to which the fuel raised in the different districts has been applied. The number of coal-mines in the different districts of the West Riding varies from two or three as the smallest, to 102 as the largest, and the quantity of coal produced in the year 1868 varied from 5450 tons, in what is called the Saddleworth and Settle district, to 2,505,000 tons in the Leeds and Normanton district. There is also a great difference in the purposes to which the coal raised in the different districts is applied. Thus in the Leeds, and also in the Bradford, the Dewsbury, the Halifax, and the Huddersfield districts, the principal purpose to which the immense supplies of coal raised in those districts is applied, is the

working of machinery employed in producing textile manufactures. In the Rotherham and Sheffield districts the principal purpose to which the coal raised is applied, is the working of iron in its various states, and the forming of machinery, iron plates, tools, implements of industry, and cutlery. In the Barnsley district, on the other hand, a very considerable portion of the coal raised is either sent to London, or other places, for domestic use, or is used in locomotives or steam-vessels. If we take the various districts of the coal-field of the West Riding, and examine the quantity of coal raised in each, we shall see how closely it is connected both with the numbers and with the rate of increase in the population.

The District of Bingley and Keighley.—The towns of Bingley and Keighley stand on, or close to, the most northern part of the Yorkshire coal-field. There is no coal of any importance in the millstone grit and the mountain limestone lying to the north of these places, except a small quantity at Ingleton, near Settle, until we come to the great coal-field of Durham and Northumberland. The whole of the coal-beds north of this line, if they ever existed, have been swept away by the process to which geologists give the name of denudation. But in that part of the valley of Aire, near which Bingley and Keighley stand, the coal formation shows itself, and extends southward from the valley of the Aire, not only to the southern limits of the county of York, near Sheffield, but through the counties of Derby and Nottingham, to Belper and to the banks of the Trent, near the town of Nottingham.

The number of collieries in the Bingley district, in 1868, was six. The position of the collieries is in most cases indicated by their names, as given in the official returns. The names of the collieries in this district were the Cullingworth, the Denholme, the Norhill (Wilsden), the Shipley Moor, and the Wilsden. The total quantity of coal produced by these six collieries in the year 1868 was 41,250 tons.

The registration district of Keighley, according to the decennial census of the people, includes the subdivisions of Keighley, Bingley, and Hamworth, and extends over an area of 46,052 acres. At the commencement of the present century, this district contained 16,489 inhabitants. In the first fifty years of the century, the population of the district more than doubled its numbers, having increased to 43,395 persons. At that time the number of persons on each square mile in the Keighley district, according to the official return, was 638,

which is in round numbers nearly twice the average rate of population throughout the whole of England, which then was 332 persons to the square mile. But during the next ten years this increase was not fully sustained, the population of the Keighley district having amounted, in 1861, to not more than 43,122. The decrease, however, was confined to the rural district, the population of the two towns of Keighley and Bingley having continued to increase.

The Bradford District.—The mineral riches of the Bradford district are very much greater than those of the Keighley district, including large quantities of very superior iron, as well as much greater quantities of coal. The number of collieries in the Bradford district was fifty in number, in the year 1868. Their names, as given in the official returns, were, the Allerton collieries, 2; the Aycliffe Hill (Horton), Birkby Lane, Bolton Wood, Booth Holme Field (Tong), Bowling, 4; Bradford, Broom Hall, Bunkers Hill, Clayton, Cleckheaton, 2; Clifton, Cotton Hole (North Bierley), Butler Height, Dog Lane, Eccleshill, Haycliff Hill (Horton), Heaton, Heaton (Shipley), High Bank (Shipley), Holme Bank, Hunsworth, Leister Dyke, Little Horton, North Bierley, 2; North Cliff, Norwood Green, Rockwell, Scholes, Seventeens (Clifton), Shelf, 2; Shipley, Shipley Moor, Smedles (Bowling), Thornton, 4; Tong, 3; Wibsey and Wike. The total amount of coal produced by the fifty collieries of the Bradford district in the year 1868 was 1,175,250 tons; and it may be stated that the great mass of this large supply of fuel was applied either to the smelting and working of the very valuable iron ores of the district, to the making of machinery, or to the generating of steam to carry on the various branches of textile industry for which the Bradford district is so much celebrated.

The Bradford registration, or census district, extends over an area of 40,334 acres, and includes the greater part of the mineral district above described.

The Bradford census district comprises the subdivisions of Bradford East and Bradford West, Bowling, Calverley, Cleckheaton, Drighlington, Idle, North Bierley, Horton, Pudsey, Shipley, Thornton, and Wilsden. The population has increased with extraordinary rapidity during the present century. In 1801 the population of the Bradford district amounted to 42,790 persons. In the first fifty years of the present century it had increased more than four fold, the population having amounted to 181,964 persons at the census of 1851. At that time the number of persons to each square mile, in the whole

of the Bradford district, was 2887. During the next ten years there was a still larger increase, and in 1861 the population of the Bradford district was 196,475 persons.

The Leeds District.—Leeds is the principal seat of the woollen manufactures of England, and the most populous town in Yorkshire. It stands in the midst of one of the richest mineral districts of the West Riding, containing no less than 102 collieries. These collieries, with the four in the Normanton district, produced 2,505,000 tons of coal in the year 1868, which is rather more than the fourth part of the whole quantity of coal produced in the county of York. The names of the coal-mines, most of which are local, will serve to show how completely they are scattered over the whole district around this ancient capital of the manufactures of Yorkshire. These names are:—Adwalton Moor colliery, Allerton Main; Ditto, Haigh Moor, Astley, Baildon Moor, Balaclava (Morley), Beeston, 3; Beeston Lodge, Beverley (Armley), Birkhill (Birkenshaw), Blakeley, Blue Hills Lane (Wortley), Britannia Main (Adwalton), Brookhouse (Gomersal), Brown Moor, Burmantofts, Bushy (Drighlington), Calverley, Churwell, 5; College (Birstall), Cross Green, Crow Trees (Gomersal), Dartmouth, Dean House (Morley), Doles Wood (Drighlington), Dye House (Gomersal), Elland Road, Ellerby Lane, Farnley, Farnley Wood, Farsley, Foxholes (Methley), Garforth, Gelder Road, Gildersome, 3; Green Man (Hunslet), Greville (Rawdon), Harehills, Holbeck, Howden Clough, Howley Park (Morley), Hunslet, Lanes Wood (Gomersal), Killingbeck (York Road), Little Gomersal, Lamb Wood, Manston, Manston Lodge, Micklefield, Middleton, Morley, 2; Morley Main, Nethertown, Neville Hill, Newmarket (Adwalton), New Hall (Middleton), Oakwell Osmondthorpe, Owlet Hall, Potter Newton, Primrose Hill (Liversedge), Quaker Lane (Liversedge), Robert Town, 2; Robin Hood, Rock (York Road), Rothwell Haigh, Scotland (Gomersal), Scratch Lane (Gomersal), Seacroft, Smithies (Birstall), Smithy Hill (Liversedge), Spring Gardens, Stanley Main (Liversedge), Strawberry Bank (Liversedge), Sykes (Drighlington), Tanhouse Mill (Liversedge), Toftshaw Moor, Tong Moor, Waterloo, Waterloo Main, Water Loose (Adwalton), Wellington, West Yorkshire (Birstall), ditto (Manston), White Horse, (York), White Lee, Wortley, 2; Victoria (Morley), Victoria (Adwalton), Victoria. It will be seen from these names that the veins of coal extend over the whole of the Leeds and Hunslet districts. Their richness is proved by the fact of their yielding upwards of 2,505,000 tons of

coal per annum. This immense supply of fuel, besides answering all domestic purposes, and illuminating the town and neighbourhood with gas (in which, within our recollection, darkness was made visible by glimmering oil lamps), also supplies the means of working every variety of machinery, and of carrying on the varied textile manufactures for which Leeds has been celebrated for so many ages.

The increase of population in the Leeds registration district, and in the adjoining registration district of Hunslet, which includes a large portion of the neighbourhood of Leeds, has been extremely rapid during the whole of the present century. The Leeds registration district only includes a portion of the borough, and extends over an area of 2100 acres. The Hunslet district, however, which includes the suburban districts, is of much greater extent, covering an area of 39,921 acres.

At the commencement of the present century, at the census of 1801, the population of the 2100 acres included in the Leeds registration district was 30,669 persons. During the first fifty years of the present century, the population of this district increased more than three fold, having risen at the census of 1851 to 101,343 persons. At that time the number of persons on each square mile amounted to no less than 30,886. The population continued to increase rapidly to the census of 1861, when it amounted to 117,566 persons.

The Hunslet registration district includes the subdistricts of Wortley, Kirkstall, Chapeltown, Whitkirk, Rothwell, Holbeck, and Hunslet, and extends over 39,921 acres. At the beginning of the present century, this extensive and populous district contained 32,340 persons. In 1851 the number had increased to 82,437. At that time the number of persons to the square mile, in the Hunslet district, was 1422. Since that time there has been a continued increase in this populous district, which at the census of 1861 contained 102,649 persons.

The Dewsbury District.—Dewsbury, on the river Calder, is another very rich mineral district. The number of coal-mines in the Dewsbury district was thirty-four, and the quantity of coal produced by those mines amounted to 395,850 tons in the year 1868. The names of the mines in the Dewsbury district were as follows:—The Batley, the Babes-in-the-wood, the Beggarington (Hartshead), Bunker's Hill (Whitley), Calder (Mirfield), Chickenley

Heath, Cowmes (Thornhill), Cross Bank (Batley), Crossley Lane, Dewsbury Bank, Dewsbury Moor, 2; Dogleach, Fall House (Whitley), Gregory Spring (Mirfield), Hartshead, Heeley (Briestfield), Hagg Wood, Hopton, Hostingley (Thornhill), Ings (Thornhill), Lane Dyehouse, Legard Bridge (Mirfield), Liversedge, Mirfield Moor, Northorpe (Mirfield), Park Farm, Raven's Lodge, Soothill, Syke Ing, Warren House, Whitley Wood, Upper Batley, and Upper Crossley.

The coal produced by the thirty-four mines in the Dewsbury colliery district, besides answering domestic purposes, and that of lighting the town and many large establishments, is chiefly applied to the generating of steam, in the numerous manufactories of the district.

The population of the Dewsbury district has increased rapidly during the present century; it extends over an area of 24,456 acres, and includes, besides the town of Dewsbury, the populous villages and districts of Morley, Batley, Gomersal, Liversedge, Mirfield, Soothill, Ossett, and Thornhill. At the commencement of the present century, at the census of 1801, the population of the Dewsbury district amounted to 29,730 persons. In the first fifty years of the century the number increased to 71,768; and at that time the number of persons on each square mile of the Dewsbury district was 1878, or in round numbers five times as great as the average population of England. At the census of 1861, the population of the Dewsbury district had increased to 92,883 persons.

The Wakefield District.—Wakefield is also the chief place in a rich mining district. The number of collieries in the Wakefield district is forty-nine, and in 1868 they produced 1,258,470 tons of coal. The names of the collieries in the Wakefield district were as follows in 1868:—Ardsley Fall, Alverthorpe, Bottom Boat, Bretton, Dewsbury Lane (Ossett), Dirtear, East Ardsley, 2; Emley Moor, Emley Park, Emroyd, Field Lane, Flockton, 3; Flockton (Overton), Flockton Moor, Gawthorp (Ossett), Gawthorp, Grange, Grange Moor, 3; Hollingthorp, Hunt Royal (Upper Whitley), Low Laiths, Lupset, Manor, Milnthorp, Needle Eye (Denby Grange), Newmarket, Nostell, Ossett, Park Lane (Ossett), Providence, Ravens-thorp, Roundwood, St. John's, Sharlston, Snapethorp, Stanley, Star (Netherton), Stocksmoor, Victoria, West Ardsley, West Field (Ossett), Woodmoor, Wrenthorpe, Winney Moor. The fuel supplied by these forty-nine mines is chiefly used for manufacturing purposes, but a portion of it is sent southward and to the seaports.

The census or registration district of Wakefield is very extensive, covering an area of 42,060 acres. Besides the town of Wakefield, it includes Bretton, Sandal, Stanley, Horbury, Alverthorpe, Ardsley, and Oulton. At the beginning of the present century, at the census of 1801, this extensive district contained 27,617 persons. During the first fifty years of the present century, to the year 1851, the population of the Wakefield district increased to 50,014. At that time the number of persons to the square mile in the Wakefield district was 781, or more than twice the average of England. The population continued to increase during the next ten years, and in 1861 amounted to 55,049 persons.

The Halifax District.—The Halifax district stands on the western edge of the Yorkshire coal-field, and is very rich in minerals. The number of mines in this district is thirty-three, and in 1868 they produced 450,500 tons of coal. The mines of this district, as given in the official returns for 1868, were as follows:—Alderscholes (Thornton), Banks, Bank Bottom, Binns Bottom, Brackens Lane End (Shelf), Bradshaw (Ovenden), Bradshaw Lane, Clayton, Crooked Lane, Dickey Steel (Elland), Dove House (Elland), Harp Bottom, (Queensbury), Highfield, Lightcliffe, Lime House, Mountain End, Park Bottom, Peep Green, Quarry House, Queensbury, Rooks (Hipperholme), Shaw Lane, Shivden, Shivden Dale, Shivden Hall, Shugden, Shugden Head, 2; Soil Hill (Ovenden) Stoneyhall, Swan Bank, and Thornton. The quantity of coal yielded by the above thirty-three mines in the year 1868 was 450,500 tons. It will be seen that the collieries are scattered over the whole of the district.

The great mass of the minerals produced in this district is applied to manufacturing purposes—the woollen and worsted manufactures of Halifax having now flourished for more than three hundred years.

The parish of Halifax is of immense extent, stretching over an area of 79,200 acres. The area of the census and registration district is less extensive, but still covers 51,784 acres. The Halifax district includes the subdistricts of Halifax, Brighouse, South Oram, North Oram, Elland, Ripponden, Sowerby, Luddenden, and Ovenden. At the commencement of the present century, at the census of 1801, the population of the Halifax district amounted to 52,027 persons. In 1851 it had increased to 120,958. At that time the average population per square mile was 1495.

persons over the whole district. Since then the population has continued to increase, and at the census of 1861 amounted to 128,673 persons.

The Huddersfield District.—The Huddersfield district also stands on the western edge of the Yorkshire coal-field, and produces large supplies of fuel. The number of coal-mines in the Huddersfield district is thirty-six, and that in the Holmfirth district thirteen, and in the year 1868 the quantity of fuel produced in the Huddersfield district was 300,500 tons, and in the Holmfirth district 87,470 tons. The names of the collieries in the Huddersfield district, as given in the official returns, were:—Box Ings, Bradley, Brockholes, California (Shelley), Clayton Common (Clayton West), Close Hill, Common Side (Cumberworth), Cowmes, Cumberworth, Duke Wood (Clayton West), Ellen Tree, Fartown, Fieldhouse, Grangehouse, Grimscar, Helm, Hollinghouse, 2; Kirkburton, Kirkheaton, Kirk Style (Cumberworth), Lane, Lane Side (Shelley), Linfit, Lockwood Common, New Ground, Pease Close, Redhill (Shelley), Rowley, Shelley, Sinking Wood, Taylor Hill, Toppit (Clayton West), Upper Bradley, Whitley (Kirkheaton), and Wood. The mass of the fuel produced in this district is used in the woollen and worsted manufactures, which are its great sources of industry and wealth.

The Holmfirth collieries are given separately in Mr. Wardell's returns. They are thirteen in number, and in 1868 produced 87,470 tons of coal. The names of these collieries are:—The Barnside (Hepworth), Brickworks, Carr Wood (New Mills), Forster Place (Hepworth), Foxhouse, Fulstone (Mew Mills), Gatehead, Hepshaw, Holling House (New Mills), Hepworth, Meltham, Thurstonland, and Wood.

The Huddersfield registration and census district is of great extent, covering an area of 66,560 acres. It includes the subdivisions of Huddersfield, Slaithwaite, Meltham, Honley, Holmfirth, Newmill, Kirkburton, Kirkheaton, Almondbury, Lockwood, Golcar, and Rastrick. At the beginning of the present century, at the census of 1801, the Huddersfield district contained 47,079 inhabitants. These numbers increased rapidly during the first half of the present century, and at the census of 1851 the population of the Huddersfield district was 123,860 persons. This was at the rate of 1191 persons to the square mile. During the next ten years the numbers continued to increase rapidly, and at the census of 1861 amounted to 131,336.

The Barnsley District.—This district is remarkably rich in coal, being situated very near the centre, and in one of the richest parts of the Yorkshire coal-field. The number of coal-mines in the Barnsley district was forty-two, and in the year 1868 this district produced the very large quantity of 1,799,500 tons of coal. The names of the mines, as given in the official returns, are, Agnes, Blacker Main, Bloomhouse Green, Church Lane (Dodworth), Darfield, Darley Main, East Gawber, Ellis Laith, Edmonds Main, Furnace Main, Gawber Hall, Haigh, Hall Royd (Silkstone), High Royd, Elsecar, Hoyland and Elsecar, Lundhill, Moor House, Monk Bretton, Mount Osborne, New Gawber Hall, North Gawber, Oaks, Old Mill, Old Silkstone, Old Silkstone Main, Pindar Oaks, Rockley coal and ironstone, Silkstone Fall, Silkstone New, or Higham, Swaithe Main, Strafford, Swallow Hill (Darton), Victoria, West Gawber, West Silkstone, White Hill or Penny Pie (Dodworth), Wharncliffe Silkstone, Willow Bank, Wombwell Main, Woolley, Worsborough Park. A large portion of the coal raised in this district, being of excellent quality for domestic purposes, is sent to London, or is consumed over a wide range of country between Yorkshire and the metropolis.

The Barnsley district extends over an area of 35,376 acres, and the population has steadily increased during the whole of the present century. It includes the subdistricts of Barnsley, Darton, Darfield, and Worsborough. At the commencement of the present century, at the census of 1801, the Barnsley district contained 11,345 inhabitants. In the first fifty years of the century, at the census of 1851, the number was found to be 34,980. This gives the population of 633 persons for each square mile. Since that time the number has increased rapidly, and at the census of 1861 amounted to 45,797.

The Rotherham District.—This district abounds in coal, which is chiefly used in the manufactures of cutlery, hardware, and for the purposes of machinery. The number of coal-mines in the Rotherham district in 1868 was twenty-three, and the quantity of fuel which they produced amounted to 570,250 tons of coal. The mines in the Rotherham district were as follows:—Aldwark Main, Aston, Carhouse, Denaby Main, Elsecar, Fence (Woodhouse Mill), Grange, Grange (ironstone), Greasbrough, Old Park Gate, Greenfield (Rawmarsh), Holmes, Kilnhurst, Kimberworth, Manvers Main, Park Gate, Rawmarsh, 2; Albany and Royal Oak, Scholes,

Thorp Common, Tinsley Park, Warren Vale, Waleswood, and West Melton.

The Rotherham registration district extends over an area of 50,591 acres, and includes the subdivisions of Rotherham, Beighton, Kimberworth, Wath, and Maltby. The population of this district in the year 1801 was 17,072 persons. In 1851 the number had increased to 33,082. At that time the number of persons on each square mile of the Rotherham district was 419. Since then the population has increased rapidly, and in 1861 amounted to 44,350.

The Sheffield District.—The Sheffield district abounds in minerals as well as in water-power, and finds abundant application for both in its extensive manufactures of cutlery, machinery, iron plates, and steel. The number of collieries in the Sheffield district in 1868 was thirty-five, and the quantity of coal yielded by those collieries was 1,075,500 tons. The names of the Sheffield collieries are as follows:—Base Green (Gleadless), Beighton, Birley, Bracken Moor (Deepcar), Brightside, Carbrook, Castle, Deepcar, 3; Dungworth, East Field (Thurgoland), Eder Cliff (Deepcar), Handsworth, Haywood, Henholmes, Hunshelf, 2; Kiveton Park, Lee Wood (Thurgoland), Manor, New Winning, Orgreave, Sheffield, Sim Hill (Thurgoland), Stocksbridge (Deepcar), St. David's, Oughtibridge, Tankersley, Thorncliffe, Thurgoland; Wharncliffe (Oughtibridge), Wharncliffe Wood, Woodhouse (Handsworth), Woodthorpe, and Wortley Silkstone.

The Sheffield district, and the district of Ecclesall Bierlow, have now joined each other, and are both increasing with great rapidity. The Sheffield district extends over an area of 10,590 acres. It includes the subdivisions of West, North, and South Sheffield, Sheffield Park, Brightside, Attercliffe, and Handsworth. The population in 1801 amounted to 39,049. During the first fifty years of the present century the population increased to 103,626. At the middle of the present century, at the census of 1851, the population of the Sheffield district was 6263 persons to the square mile. Since that time it has rapidly increased, and at the census of 1861 amounted to 128,951 persons in the district.

The Ecclesall Bierlow district extends over an area of 20,860 acres. It includes Upper and Nether Hallam, Norton, and Ecclesall Bierlow. At the commencement of the present century, at the census of 1801, the population of this district was 10,259. The increase was rapid during the first few years of the present

century, and in 1851 the population had increased to 37,914. Subsequent to that time the increase was still more rapid, and at the census of 1861 the population of the Ecclesall Bierlow district had increased to 63,618 persons. The number of persons to the square mile was 1163 in 1851.

The District of Wortley.—This beautiful district is on the edge of the Yorkshire coal-field, and possesses considerable mineral wealth, as well as great natural beauty. The number of coal-mines within the Penistone district is five. The quantity of coal produced in 1868 in the Penistone and Pontefract districts together was 75,000 tons. The names of the collieries in the Penistone district are Berry Moor, Bullhouse, Crow Hedge, Denby Dale, and Middlecliffe.

The registration district named from the village of Wortley is of great extent, covering an area of 85,790 acres. This district includes Wortley, Penistone, Canthorne, High Hoyland, Ecclesfield, and Bradfield. In 1801 it contained 18,266 inhabitants; this number had increased in 1851 to 32,012, and still further in 1861 to 38,511.

The Todmorden District.—This district, which abounds in wealth and population, as well as in mineral resources, stands on the eastern edge of the Lancashire coal-field, which is separated from the Yorkshire coal-field by a great range of mountains and moors formed of the millstone grit. It is closely connected, however, with the manufacturing district of Yorkshire, by the river Calder, which rises on the Lancashire side of the hills, but flows westward down the rich and beautiful vale of Todmorden, into the river Aire at Castleford, and ultimately into the river Humber and the German Ocean. The coal-field of Lancashire has already been fully described by the author of this work, in his account of "Lancashire and Cheshire, Past and Present." All that is necessary to say about it here is, that that portion of the Lancashire coal-field which extends to Todmorden belongs to what is called the Lower, or most ancient, portion of that great coal-field, and is found through the whole of the hilly or mountainous region, by which the Middle coal-field of Lancashire is encircled.

The Yorkshire division of Todmorden extends over an area of 26,920 acres, and includes the subdivisions of Todmorden and Hebden Bridge. At the beginning of the present century the whole district contained 15,530 inhabitants. In the first fifty years of the present century, at the census of 1851, the number

had increased to 29,727. At that time the population per square mile in the Todmorden district was 707 persons. Between the census of 1851 and that of 1861, the population of the Todmorden district increased to 31,118.

The Saddleworth District.—This extensive district is much more closely connected with the Lancashire than with the Yorkshire coal-field, although it has two coal-mines on the Yorkshire side of the hills. Their names are, the Ashes and Strinesdale. There is also a vein of coal at Ingleton, near Settle, which is worked at the present time. The Ingleton mine, with the Saddleworth mines, produced 5450 tons of coal in the year 1868. Originally the mills of the Saddleworth district were chiefly turned by the stream of the river Tame, which flows down from the higher part of the Yorkshire hills into the river Mersey, joining it at Stockport.

The Saddleworth district extends over an area of 18,280 acres. It includes the subdivision of Delph and Upper Mill. At the commencement of the present century the population of the Saddleworth district was 10,605. In the first fifty years of the present century the number increased to 17,799. In 1851 the population of Saddleworth was 623 to the square mile. The number continued to increase to 1861, when it amounted to 18,631 persons.

Normanton, near Pontefract, is on the eastern edge of the Yorkshire coal-field. The number of collieries in that district is six. Their names are Allerton Bywater, Featherstone, Glas-Houghton, Newton Main, Snydale, and Wheldale.

The above districts include the whole coal-field of the West Riding, so far as it has been at present explored. But there can be no doubt, after the successful sinking of the Shireoaks pit through the Permian strata, that much coal also exists below that formation. Whether it will be found profitable to work it can only be proved by experiment. The question of the probability of finding beds of coal in other parts of Yorkshire, has been ably discussed by Sir Roderick Murchison. But his remarks relate rather to the North Riding than to the West, and shall be considered when we have given some account of the rich iron district of Cleveland.

The coal-field of the West Riding, which we have above described, is the great manufacturing district of Yorkshire. It will be seen that the population has increased in this district, during the whole of the present century, with a rapidity that can only be equalled

in a few districts of England similarly situated, in London, and in the newly peopled regions of America. There is no reason why this district should not continue to increase to the close of the present century, and even to a much more distant period; for neither its mineral wealth, nor the industry and ingenuity of its inhabitants, are in any degree exhausted; and wherever profitable employment increases, population increases in a similar ratio.

The following table will show the progress of population in the districts on the Yorkshire coal-field during the present century:—

PROGRESS OF POPULATION ON THE COAL-FIELD AND IN THE MANUFACTURING
DISTRICTS OF THE WEST RIDING.

District.	Area in acres.	Population.			Num. of persons to square mile.
		1801.	1851.	1861.	1851.
Bingley & Keighley,	46,052*	16,489	43,395	43,122	638
Todmorden, . . .	26,920	15,550	29,727	31,113	707
Saddleworth, . . .	18,280	10,665	17,799	18,631	623
Huddersfield, . . .	66,560	47,079	123,860	131,336	1,191
Halifax,	51,784	52,027	120,958	128,673	1,495
Bradford,	40,334	42,780	181,964	196,475	2,887
Leeds,	2,100	30,669	101,343	117,566	30,886
Hunslet,	39,921	32,340†	82,437	102,649	1,422
Dewsbury,	24,456	29,730	71,768	92,883	1,878
Wakefield,	42,060	27,617	50,014	55,049	781
Barnsley,	35,376	11,345	34,980	45,797	633
Wortley,	85,790	18,266	32,012	38,511	239
Ecclesall-Bierlow, . .	20,860	10,259	37,914	63,618	1,163
Sheffield,	10,590	39,049	103,626	128,951	6,263
Rotherham,	50,591	17,072	33,082	44,350	419‡

* The area of the Keighley district, which includes Bingley, is given in the Census Returns of 1861, vol. i. p. 598, at 39,144 acres.

† At the Census of 1851 and 1861 the area of the Hunslet division is given at 35,272 acres.

‡ England and Wales:—Registration district, number of persons to a square mile in registration district. Census of Great Britain, 1851, vol. i., table 21, p. cxi.

The Iron mines of the West Riding.—We have already stated that the iron-mines of Yorkshire produce a larger quantity of that valuable metal than those of any other district of England, and that the quantity of iron yielded by them has increased with extraordinary rapidity during the last thirty years. Much the largest quantity of the Yorkshire iron is now obtained in the North Riding, from the strata of the Lias formation; but in the West Riding the coal measures have always yielded a considerable supply of iron of excellent quality. We shall speak of the iron trade of the North Riding in a subsequent part of this chapter, but

we must briefly notice the iron trade of the West Riding before proceeding any further.

The quantity of iron ore produced in the West Riding in the year 1868 was 785,628 tons. The Low Moor mines are much the most productive, yielding in that year 596,628 tons of ore. There are also extensive mines at Farnley, Thorncliffe, and other places. The value of the iron ores of the West Riding in 1868, was estimated at the sum of £196,407. The number of iron furnaces in the West Riding in the same year was thirty-eight, of which twenty-two, producing 100,050 tons of pig-iron, were in blast. The iron furnaces were situated at Ardsley, Leeds, 2; Beeston Manor, 2; Bowling, 6; Elsecar and Milton, Barnsley, 6; Farnley, 4; Holmes and Parkate, 3; Low Moor and Bierley, 8; Thorncliffe and Chapel Town, Sheffield, 2; Worsborough, 1; Whitehorse, Leeds, 2; Hepworth, 2: thus making a total of thirty-eight furnaces, of which twenty-two producing 100,050 tons of iron were in blast in the year 1868, a year of unusual depression.

The iron-producing district of the West Riding of Yorkshire may be divided into two parts—the northern or Bradford, and the southern, which ranges from Leeds, through Barnsley, to Sheffield and Rotherham.

In the Bradford district are found the beds of coal and ironstone which have given rise to the ironworks of Low Moor, Bierley, and Bowling, celebrated for the production of the best irons made in Britain; and those of Farnley, which are following in the same steps. The castings from these works are largely employed for special purposes, where strength and tenacity are required, as for mortars and sea-service guns. Their wrought iron, the quality of which is attested by its bringing nearly twice the price of ordinary English iron, has the peculiarity of a granular structure with a uniform, small, and brilliant grain, which closely resembles the character of the Swedish bars.

Coal-measure ironstones are alone employed in this district, and principally from two ranges of strata called the White Red Mine and the Black Red Mine, respectively; a third, the Brown Rake, was formerly worked. Neither their quality nor their abundance have much contributed to the celebrity of the Low Moor iron, as the result of analysis and comparison with other coal-fields will show. The superiority appears to proceed from the care and attention bestowed upon the various processes, and from

the admirable character of the seam of coal, termed the "better bed," which lies beneath the ironstone, and attains a thickness of only one foot eight inches to two feet. It differs, however, from ordinary coal, in its remarkable freedom from iron pyrites and other impurities, and is exclusively used for smelting, refining, and puddling. You may pass through the thick smoke of the coking heaps or ovens without the least inconvenience from the sulphurous gases, which, in the coking of most coals, are so freely liberated.

These ironstones, as usual with their class, are exposed for many months to the weathering action of the atmosphere, in order to free them from the shale; they are then calcined previously to smelting, and unusual care is taken to pick out every kind of refuse or impurity.

The higher band, the white bed, is characterized by the pale, drab colour which pervades most of its courses, although inclosed in a darker shale or bind. The black bed is of the blackish grey tint, more usual with clay ironstones, and occurs in detached nodules of various sizes, but, taken as a whole, smaller than those commonly worked in coal-fields.

"The extension of these rows of nodules and their accompanying coal-seams over other portions of Yorkshire," says the author of the 'Essay on the Iron Ores of the North and North Midland counties of England,' in the Memoirs of the Geological Survey of Great Britain, "is a question of much interest, when we know how persistent some similar beds are over very large areas. But the quality of coal in the same seam will often vary within a small distance; and ironstones, either by running smaller, or by their courses being separated by a thicker band of shale, may become unworkable. Several trials already made in search of the Low Moor series have proved this deterioration; and although it may be predicted that the same strata may be followed up on the dip, far beyond where they are at present known, it is by no means certain that they would retain the qualities which have given them celebrity."

In the South Yorkshire or Barnsley district, the ironworks are situated between the North Midland Railway and the line of high ground, which, abounding in gritstones and flags, marks the outcrop of the lower portion of the coal measures. A beautiful district by nature, the West Riding of Yorkshire has not yet

been despoiled of all its picturesque character; and specially in the iron-bearing districts are the hills well clothed with wood, the valleys deeply cut and adorned by rapid streams. From the banks of the river Don which flows past Sheffield, rise in bold masses the Wharnccliffe rocks, which may be followed along the out-crop in a north and south direction, dipping with the rest of its measures towards the east, and forming the base of that portion of them which yields the ironstones and coals of the tract under consideration.

From Park Gate, near Rotherham, over Lord Fitzwilliam's fine property of Wentworth, to Tankersley, and on to the west of Barnsley, may be traced in succession many of the more important bassets of ironstone, the value of which, added to a particular method of working, has imparted a strange aspect to the surface, which is reflected in the well executed shading of the Ordnance map.

Wherever the courses of ironstone nodules come up to within a short distance of the surface, they are worked in the small shafts termed *bellpits*, disposed in great numbers along the line of strike, at a distance of a few feet only each from the other.

The result of the *belling*, and the open work which not uncommonly accompanies it, is to leave long lines of irregular holes and pits often so considerable as to unfit the land for agriculture, and to induce the planting of belts of trees. The ironstone bind, or shale, appears not to be prejudicial to their growth, and the strips of plantation thus offer to the eye, even from a distance, a clue to the arrangement of the strata beneath the surface.

The beds of coal and of ironstone frequently change their appellation in passing from one part of the district to another, so that it becomes difficult to identify them in distant localities without a very accurate study. The Rev. Mr. Thorpe has published a valuable aid in this direction, in his section of the Yorkshire coal-field, where he has united the sinkings and borings over a very large area.

The more important of the ironstones employed in the West Riding are interstratified in about 1000 feet thickness of measures, which intervene between two well-marked beds of coal—the Barnsley thick coal and the Silkstone—and are known as the Swallow Wood, the Lidgate, Tankersley, Thorncliffe Black Mine, Thorncliffe White Mine, and Clay Wood Mine.

The Thorncliffe, or Old Black Mine, yields about 1500 tons of ironstone to the acre. The Tankersley, or "Musselband," ironstone yields on the average about 2000 tons to the acre, although as much as 3400 tons has been exceptionally produced. It is so called musselbed from the great number of fossil shells (Unio) which characterize it.*

The following is an analysis of Thorncliffe or Old Black Mine, Parkgate, and of Thorncliffe White Mine, Parkgate, Yorkshire:—

RESULTS TABULATED.

Thorncliffe, or Old Black Mine.		Thorncliffe White Mine.	
Protoxide of iron,	41·77	Protoxide of iron,	39·38
Peroxide of iron,	1·96	Peroxide of iron,	1·24
Protoxide of manganese,	1·13	Protoxide of manganese,	0·95
Alumina,	0·58	Alumina,	0·82
Lime,	2·55	Lime,	2·26
Magnesia,	3·71	Magnesia,	3·72
Carbonic acid,	31·39	Carbonic acid,	29·38
Phosphoric acid,	0·75	Phosphoric acid,	0·47
Sulphuric acid, }	traces.	Sulphate of baryta, }	traces.
Bisulphide of iron, }		Bisulphide of iron, }	
Water, hygroscopic,	0·55	Water, hygroscopic,	0·68
Water in combination,	1·15	Water in combination,	1·41
Organic matter,	0·86	Organic matter,	0·54
Insoluble residue,	14·16	Insoluble residue,	19·35
	100·56		100·20

INSOLUBLE RESIDUE.

Thorncliffe, or Old Black Mine.		Thorncliffe White Mine.	
Silica,	8·93	Silica,	12·16
Alumina,	4·21	Alumina,	5·00
Peroxide of iron,	0·43	Peroxide of iron,	0·43
Lime,	trace.	Lime,	trace.
Magnesia,	0·14	Magnesia,	0·17
Potash,	0·43	Potash,	0·37
	14·14		18·75
Iron total amount,	34·61	Iron total amount,	31·82

None of the metals precipitable by sulphuretted hydrogen from the hydrochloric acid solution, were found in 500 grains of ore. In the Thorncliffe White Mine a minute trace of copper was detected in 450 grains of the ore.†

The following is the analysis of the iron ores of the White Bed Mine, Bierley, and the Black Bed Mine, Low Moor, according to the report published in the Memoirs of the Geological Survey of Great Britain:—

* Memoirs of the Geological Survey of Great Britain, &c.: the Iron Ores of Great Britain, part 1, page 30.

† Memoirs of the Geological Survey of Great Britain: The Iron Ores of Great Britain, part 1 p. 66 to 74.

RESULTS TABULATED.

White Bed Mine, Bierley.		Black Bed Mine, Low Moor.	
Protoxide of iron,	35.38	Protoxide of iron,	36.14
Peroxide of iron,	1.20	Peroxide of iron,	0.61
Protoxide of manganese,	0.94	Protoxide of manganese,	1.38
Alumina,	0.80	Alumina,	0.52
Lime,	2.78	Lime,	2.70
Magnesia,	2.22	Magnesia,	2.05
Carbonic acid,	25.41	Carbonic acid,	26.57
Phosphoric acid,	0.48	Phosphoric acid,	0.34
Sulphuric acid,	trace.	Sulphuric acid,	trace.
Bisulphide of iron,	0.18	Bisulphide of iron,	0.10
Water, hygroscopic,	0.74	Water, hygroscopic,	0.61
Water, combined,	1.11	Water, combined,	1.16
Organic matter,	0.23	Organic matter,	2.40
Insoluble residue,	28.00	Insoluble residue,	25.27
	99.47		99.85

INSOLUBLE RESIDUE.

White Bed Mine, Bierley.		Black Bed Mine, Low Moor.	
Silica,	19.13	Silica,	17.36
Alumina,	6.83	Alumina,	6.22
Peroxide of iron,	0.57	Peroxide of iron,	0.84
Lime,	0.11	Lime,	trace.
Magnesia,	0.07	Magnesia,	0.12
Potash,	0.78	Potash,	0.66
	27.49		25.20
Iron total amount,	28.76	Iron total amount,	29.12

In the White Bed Mine, Bierley, a distinct trace of copper was detected in 500 grains of the ore. In the Black Bed Mine, Low Moor, none of the metals precipitable by sulphuretted hydrogen from the hydrochloric acid solution, were found in 600 grains of ore.

Building Materials on the Coal-field of the West Riding.—The great increase of population, and the rapid development of industry, in the manufacturing districts of Yorkshire, have been much promoted by the abundance of building materials which exists throughout the whole of them. Amongst these materials are building clay and stone of many varieties, and large quantities of flags and slates suitable for roofing and other purposes. Without these abundant supplies of materials for building it would have been very difficult, and still more costly, to have erected the numerous large towns which have sprung either from nothing, or from comparative insignificance, during the present century; to have built the numerous mills and workshops in which so large a number of the people find employment; and to have constructed the railways, bridges, viaducts, reservoirs, and other great public and private

works, which have given fresh life and energy to personal communication, and to every branch of industry. Each district of the West Riding possesses its peculiar advantages as to building materials. Those portions of it which stand on the coal measures generally possess clay, suitable for bricks, in great abundance near the surface; and some of the varieties of clay found in those districts have great value for other purposes besides that of building, such as the making of earthenware, tiles, and pottery. In the same districts, as at Bramley Fall and other places, are also found building stone of extraordinary hardness and durability, from which many great public works have been constructed, not merely in Yorkshire, but in the metropolis and other parts of the kingdom. To the west and north of the coal-field, building stone is found everywhere, and there the mills and factories, as well as the towns, are formed of stone. This is the case around Halifax, Huddersfield, and Sheffield, and generally to the north of Bingley, Keighley, Otley, and Harewood. The varieties of building stone and of flags in these districts are very numerous, and are found to answer every purpose of construction.

Amongst the flagstones found in the West Riding, some have been very carefully examined by geologists, and the mode of their formation has been traced. The following is a summary of some interesting observations on this subject, from a paper, on the Yorkshire flagstones and their fossils, read by Mr. William Baines at the meeting of the British Association at Leeds, in the year 1858:—On a bleak moor side, in the shelving formation of a fine sandstone, was a hollow dammed across, for the accumulation of rain-water for scouring purposes. In a few years the hollow was filled up by a gradual deposit of sand from the water. When dug out there were presented finely laminated strata. In noticing these depositions, the author found that each layer was the deposit of one shower; and in proportion to the quantity or time of each succeeding rain did the thickness of the deposit depend; each layer was the effect of one flood, a time intervening when the sand was all accumulated at the bottom, and the water had smoothed its surface by a very gentle action, so that the smoothed bed would not allow of the next flood's deposit mixing with it.

The laminæ of the rock may be as thin as paper, or one inch thick for roofing slate; or two or three inches thick, which is the Yorkshire flag; or an uninterrupted deposition of ages, when it

becomes the cutting stone or ashlar, a number of square yards in one mass without any cleavage. This Yorkshire flag, then, is but the pond deposit above noticed, on a larger scale, and the deposit of some ancient estuary, whose waters washed the finer particles of the carboniferous sandstone from the Halifax and Todmorden districts. But the deposition must have taken place, if not in deep water, certainly in still water; for the smallest, even the faintest breeze of wind, produced ripple-marks, as thousands of the freestone slabs show in the strata overlying the flag formation: and the uppermost strata must have been formed in shallow water, and at times completely dry, as there are hundreds of acres which bear impressions of rain or hail drops having impinged upon the strata in process of formation. There are great quantities of the tracks and depositions of Annelides, or, as they are locally termed, the "earthworm." It is a formation extremely barren of animal remains.

The Flora in the Yorkshire flag are not so numerous as in the ragged or crooked stone above and below, simply from its being a quieter deposit than the other strata. The most common fossil found in this formation and its kindred shale is the Calamite, some shales between the different strata being literally composed of its impressions. The next most common plant is the *Stigmaria* in profuse abundance; but very rarely the trunk, or *Sigillaria*. It is quite evident that the tuberous appendages or roots denote it to be a mud plant. Some of the most magnificent and perfect specimens of the *Lepidodendron* are found in this stratum. There are also *Pecopteris nervosa* and *Neuropteris*, &c.; as also a few fossil fruits, similar to *Trigonocarpum ovatum*.

The Agriculture of the Coal-field of Yorkshire.—The coal-field of Yorkshire has the advantage, as an agricultural district, of being varied by hill and valley, and of being drained by several rapid rivers and numerous small streams. Towards the west of this region, along the line of the mountains, the rainfall is very heavy, but from the steepness of the land, the water flows rapidly down into the brooks and rivers, or sinks into those clefts in the rocks from which the flow of the streams is maintained in the summer months. Mr. Charnock, in describing the agricultural resources and the scenery of the Yorkshire coal-field, says, that the undulation of the surface which it exhibits forms a constant succession of hill and dale; and rising, as the back grounds occasionally do, to more than ordinary altitude, a varied land-

scape of much beauty and richness is constantly presented to the eye of the traveller. Commencing at Harrogate, where the indications of the mineral wealth of the formation seem first to manifest themselves, there is a succession of steplike configurations of surface gradually ascending into Derbyshire and Cheshire; the general dip of the strata being to the north-east, until it reaches the comparatively narrow belt of the magnesian limestone, separating it from the lower levels of the Vale of York and the confines of the eastern boundary of the Riding. By far the largest portion of the soil on this formation is of a strong character, resting on the ordinary subsoil of yellow clay so general in the coal districts. In those parts, however, where the sandstone beds and shale approach the surface sufficiently near to render it naturally dry, a good, and in many cases very productive, soil is found.

Of the agriculture of the district Mr. Charnock says, "Unlike some of the more northern coal districts, where the immense value of the underground product seems to have operated rather as a reason for the almost total disregard of the surface, than as an inducement for any cultivation of the soil, the more grateful sons of this locality have bestowed upon mother earth a culture which, if not of the highest order, is at least perhaps commensurate with the time that could be spared from more immediately profitable occupations."*

From Harrogate, proceeding southward to Harewood, is a strong clay soil, and most of it thin and poor. At Harewood, where the rise occurs, and the rock approaches nearer the surface, the land is somewhat less strong, and of superior quality. The clay, however, soon appears again, and with it a much less fertile soil, until we come to Potter Newton and Chapel Allerton, where the rock comes to the surface, from the pounding of which a yellow sand is made, and sent into Leeds in considerable quantities. Leaving Leeds, which is situated in the valley, and where we again have the clay and stiff soil, the ground rises to Rothwell Haigh, at which point there is a tract of fine dry land, which by good management and an abundant supply of manure from Leeds, produces heavy crops of swedes, barley, clover, and wheat. Many coal-pits are at work over this district. Passing Rothwell, we have the clay again over Wakefield Out-wood, and to the town itself, where the sandstone rock, with a thick covering of shale and some clay at the surface, gives to

* Prize Report on the Agriculture of the West Riding, by John H. Charnock, Esq.

the soil the character of a strong yet productive loam, which by tolerable care and tillage produces heavy crops of grass, corn, and vegetables. A large portion of the land in this immediate vicinity is in market gardens, from which many of the more densely populated manufacturing towns of the Riding are almost exclusively supplied.

Passing from Wakefield we find, as the ground gradually ascends, a greater proportion of dry and good land, and that, as the contour becomes more marked, the transitions from the friable soils of the sandstone to the stronger ones of the clay subsoils are more abruptly noticeable—the clay occupying its place in the valley, and the sandstone up the rise. With few exceptions, the dry land lies to the north-east, on the back of the strata; whilst that on the face-side of the rise to the south-west, is wet and springy, and of a much less fertile description. At Woolley, Staincross, and Barnsley these features are very perceptible; after which we meet with exceptions to this order in a considerable tract of clay subsoils, interspersed with a saturated subsoil of light-coloured aluminous sand, very wet, extending to Sheffield and up to Wortley, and thence forward, with but little variation, to the prominent point of Wharnccliffe Brow.

From these rocks there is a most magnificent prospect towards Derbyshire and Lancashire, with the gorgeous carpet of Wharnccliffe Wood spread out at the foot, and covering with its varied shades an undulating area of about 2000 acres. There are, of course, many gradations in quality, both on the strong and lighter lands of the coal measures, from the poor thin soils of its strongest clays to the eight and ten inch loams of the sandstone; but the same general order of succession occurs with much uniformity over the whole breadth of the formation, as is well known on the route selected for its illustration, the reason for selecting which has been, that it is, probably, the one most immediately within the recognition of the general reader.

The great defect on the strong lands of the coal formation is the want of systematic and effective drainage. Where this has been properly attended to, fine crops of every kind are obtained, and even the hedges and young trees show a vigorous growth. After thorough drainage, green crops of every kind can be grown with great advantage. Throughout the whole of this district there are abundant supplies of manure of every kind, and attention has been recently turned at Bradford and other places to the application of

sewerage of large towns to the fertilizing of the soil. This mode of improvement is comparatively new, but when fully developed it promises to render all the towns in the district much more healthy, and the country about them much more fertile.

Currents Prevalent at the Time when the Yorkshire Coal-field was Formed.—In a paper on the thickness of the carboniferous rocks of the Pendle hills, read before the Geological Society in the year 1868, Mr. Edward Hull expresses his concurrence, founded on recent examination, in the opinion which Professor Phillips had previously expressed, in his "Geology of Yorkshire," as to the nature and direction of the currents which prevailed at the time when the carboniferous beds and the millstone rocks of Yorkshire were originally formed. The constitution of these two formations is so extremely different, as to render it impossible that they should have been derived from materials of the same nature. On this subject Professor Phillips observes, "that the thickness and purity of the argillaceous deposit being in the west, and the same qualities belonging to the gritstones in the north, we may venture to suggest, as an explanation, the entrance of two distinct currents or primeval rivers; one on the west, bearing sediment from the surface or region of argillaceous slate; the other from the north, bearing almost wholly the granular detritus of regions abounding in gneiss and mica slate."*

In a paper on the currents present during the deposition of the carboniferous and Permian strata in South Yorkshire and North Derbyshire, read at the meeting of the British Association for the advancement of Science, held at Leeds in the year 1858, by Mr. H. B. Sorby, F.R.S., the same subject was also discussed; and the chief conclusions derived from numerous observations on the coal-field of Sheffield and South Yorkshire was, that during the period of the deposits of the millstone grit there was a very uniform general current from the north-east, slightly interfered with by a tide setting from the north-west, and by the action of surface-waves and wind-drift currents, produced by the powerful westerly gales. This general north-east current was also present during the deposition of the gritstone beds in the lower part of the coal strata, in the shales associated with which genuine marine shells are found, but ceased towards the central portion, more productive in coal, where such marine shells do not occur. In that part of the series,

* Professor Phillips' *Geology of Yorkshire*, new edition, vol. ii. p. 188.

in different localities and beds, the currents were from all parts of the compass, but on the whole, chiefly from the west, as if in some way or other connected with the prevailing westerly winds and wind-drift currents, which here prevailed independent of the tide or general north-east current, on account of the connection with the main sea having been cut off. During the deposition of the magnesian limestone the sea appears to have been subject to a very decided tide, rising and falling with great uniformity, from west-south-west to east-north-east, amongst a number of shoals on which surface-waves stranded, chiefly produced by easterly winds. The millstone grit and lower coal measures, therefore, present us with an admirable example of the action of a simple current, flowing only in one direction; whereas the magnesian limestone is a very excellent illustration of the effect of oscillating currents moving backward and forward in a particular line, like the currents produced by the rise and fall of the tide.

The Magnesian, New Red Sandstone, and Alluvial Districts of the West Riding.—To the east of the carboniferous formation of the West Riding lies a fertile and extensive district, resting on the Magnesian and Trias formations, and the deep alluvial deposits which overlie the latter formation. This is one of the best agricultural districts in the north of England; but contains very few minerals, with the exception of limestone and building stone, both of which are found in great abundance in some portions of the district, though they are entirely wanting in others. This district extends from the borders of Nottinghamshire, near Tickhill and Bawtry on the south, to the neighbourhood of Ripon in the north; and from Pontefract on the west, to Selby, York, and the Ouse and Derwent on the east. It includes the southern part of the vale of York and the lower portion of the valleys of the Don, the Aire and Calder, the Wharfe, the Nidd, and the Ure. It is almost exclusively an agricultural district, but its cultivation is considerably modified by the proximity of the large towns and the great markets of the manufacturing districts, which render it profitable to attend to some branches of cultivation, which are not worth following in districts where the population is thin and the markets are comparatively poor.

The Permian or Magnesian Limestone.—The first of these formations is the magnesian limestone, the southern part of which has recently been examined, in the course of the Geological Survey of

England. This formation, which extends from Nottingham on the South to Newcastle-on-Tyne on the north, enters Yorkshire on the south, between Tickhill and Rotherham, and runs northward in an unbroken line by way of Pontefract, Castleford, Wetherby, Knaresborough, and Ripon, to the neighbourhood of Masham and Bedale. Speaking of this soil, Morton in his work on soils says, "From statements which have been repeatedly copied, that magnesian lime is pernicious to the growth of vegetables, we should naturally expect the soil of this formation, if it partakes in the smallest degree of the nature of the substance of the rock, to be sterile and barren; this, however, is not the case, for although the soil is in general thin on the magnesian lime, yet it is a good light soil for arable culture, and with manure produces good crops. From Nottingham to Boroughbridge this soil is profitably cultivated as arable land, and produces good turnips, potatoes, barley, and wheat."

In the recent Memoir on the subject of that part of the Geology of southern Yorkshire to which we have already alluded, it is stated that the lower magnesian limestone generally forms high and dry ground, with a light arable soil. It rises from the coal-measure strata with a steep escarpment, and then slopes down gradually to the ground occupied by the middle sandstones and marls, which form a wet and heavy soil, when not too thickly covered by drift. The upper magnesian ground rises, like that of the lower magnesian limestone, with a steep escarpment to the west, and also forms good arable soil, having its more gentle slope to the east. The pebble beds form another steep ridge with a westerly face, and this ground, with many undulations, slopes towards the valley of the rivers Idle and Trent.

The Permian strata in the southern part of Yorkshire are divided into two chief parts, the former known as the lower red sandstones and marls, or *Rothe Liegende* of the German geologists; and the second, the magnesian limestone series. The former consists, sometimes of red marl, sometimes of purple grit, sandstone, or shale, and sometimes of unconsolidated sand. The purple grit and sandstone attains a considerable thickness in this district. In the higher part of the Shireoaks pits' section may be noticed some grey and red rock, sixty-six yards in thickness, which is believed to represent the Rotherham red rock—a rock which is well known as affording the hard grindstones used in the Sheffield cutlery works. The red rock is well exposed in a quarry at Harthill,

where it is worked for scythe-stones. Here, in a face of forty feet, may be seen thick irregular beds of purple grey grit, much cut up with joints and lines of false bedding. West of Harthill Grange there is another quarry of these grits, but of a lighter colour. The grits in this quarry are overlaid by sandy shale and purplish marl. A little way south of this quarry the red rock disappears, being overlapped by the magnesian limestone. In most of the quarries fragments of fossil plants occur, and the following list, by Mr. Salter, is from specimens collected at Harthill :—*Lepidodendron aculeatum*, *L. alveatum* ; *Sigillaria*, large indeterminate fragments ; *Calamites Suchovii*. The ground occupied by the Harthill sandstones and red rock of Rotherham forms a strong contrast to that of the coal formation; for while the latter makes a heavy clay soil, very wet, and of a dark-brown colour, the former is covered by a light sandy soil, very dry, and coloured red. Springs of water are everywhere thrown out round the base of the red rock, which help to mark its lower line of boundary. Mr. Talbot Aveline says, in his report on the geology of this part of Yorkshire, that a careful survey of this district convinces him that the Rotherham rock is the equivalent of that of Harthill and South Anston, being a large outlier, resting unconformably on the coal measures. Between Maltby and Roche Abbey, the limestone forms the steep sides of the valley, with red beds at the bottom, while the brook that flows through the valley has cut down to the coal measures. This shows that the red beds here formed a thin regular band at the base of the limestone.

In describing the lower magnesian limestone, it is stated that it consists of two great bands, separated from each other by marls and sandstones. It is extensively quarried for building stone, and for being converted into lime. In the Streetly quarries, near Worksop, the rock consists of a highly crystallized limestone. Some beds are of a very white colour, and others vary from white to grey and yellow. This stone is quarried in tolerably regular blocks, from two to three feet thick. It takes a smooth polish, and is largely used as a building stone. St. George's Church, Doncaster, was built with this stone. At Shireoaks quarries there occurs a hard compact limestone, of a light cream colour. The surfaces of the beds are rough, and display a sort of fretted structure, which, in a hand specimen, might at first sight be mistaken for weathering. This has been described by Professor Sedgwick, who remarks, "In

passing into a solid state some of these beds have penetrated each other, so that their separation is not represented by a plane superficies, but by a number of imperfectly crystalline points and protuberances, which give to the surface of the blocks an appearance resembling artificial rustic work. These natural surfaces have been occasionally used in ornamental architecture." From the North Anston quarries much of the stone used in building the houses of Parliament was brought; the lower part only of the palace at Westminster being built of the Bolsover and Mansfield Woodhouse stone, which was chosen by the royal commissioners. The North Anston rock has rather a close grain, and is very hard, and both bedding and joints are very regular, so as to produce large rectangular blocks, measuring eight feet by three feet, and one and a half feet. The stone of the Roche Abbey quarry is a beautifully white, fine crystalline rock. It has been extensively quarried for building stone and sculpture work. A fresh fracture of this stone shows a surface white as chalk, with a sparkling lustre, more resembling lump sugar than anything else.

From the southern border of Yorkshire to the northern extremity of the West Riding, some miles to the north of Ripon, the lower magnesian limestone, with its valuable beds of limestone and building stone, runs in an unbroken line. Along the whole of this great deposit of building stone and limestone there are almost innumerable quarries, lime pits, and lime kilns. The limestone when burnt is very extensively used in the cultivation of the soil; and the building stone has furnished the materials for erecting most of the finest churches, castles, and mansions in the central parts of Yorkshire.

In an account of the Permian formation of Yorkshire, published by Professor Phillips so long ago as 1828, it is stated that the Permian formation is a long and narrow slip of land running north north-west, and south south-east, with a maximum width of five miles. It usually forms a well-marked escarpment, often of comparatively great elevation above the low-lying vein of coal measures to the west, as at Barnborough Cliff, Hooton Pagnall, and several other places, where the view westward is magnificent. A splendid section is seen in the valley of the river Don, near Conisborough. For architectural purposes this limestone is, perhaps, unequalled in England. It is found in large-sized blocks, with a texture and hardness suitable for delicate masonry, and will withstand almost any amount of weathering. The small-grain dolomite

is found at Warmsworth, Levit Hagg, Cusworth, Outbore, Cockhill, Sprotborough, Roche Abbey, and Brodsworth. The cliffs are seen to great advantage in the vale of the Went, and on the banks of the Don. The quarries are seen in the neighbourhood of Pontefract, and along the whole line of this formation, from the northern to the southern limits of the West Riding.

The magnesian limestone, running through the more exclusively agricultural districts of the Riding, is much less subject, in the cultivation of its soils, to those varieties and peculiarities in cropping, which are induced by circumstances over the more variable and densely populated localities of the coal measures. Being of a naturally dry and friable nature, this soil is well adapted for turnip husbandry. The usual rotation is the four course of turnips, barley, seeds, and wheat, varying the grain crops occasionally, and substituting red clover for seeds. Peas are also grown on the deeper portions of this soil, and are a judicious and profitable adjunct in the rotation, large quantities being pulled green, and sent to Leeds and other surrounding markets. The six-course shift is sometimes followed, and when conducted with skill and judgment is suitable for this land.

Mr. J. H. Charnock says:—"I am indebted to Mr. Charles Charnock for the following account of his Holmfield House farm, near Ferrybridge, to which I would direct attention as one of the best specimens of thoroughly good farming that is to be met with, amongst the many which exceed mediocrity, on this formation. The farm contains 520 acres; 400 being arable, and 120 grass. The general rotation is turnips, barley, seeds, wheat; varied by 20 acres each year out of the 400 being subjected to the following cultivation:—After the wheat the stubble is cleared, manured, and sown with tares, which are cut for the horses the following spring. The land is then prepared and drilled on the flat with stone turnips (manured with about ten bushels of bones per acre), which are eaten on with sheep. And the following year, it is prepared and sown in the same way with swede turnips, manured in a similar manner.

"The wheat crops are always manured with rape-dust, at the rate of about one and a half quarter per acre. Mr. Charnock says he finds guano on this soil does not answer for corn crops, and but very indifferently for turnips. He has grown good crops of turnips with nothing but sulphuric acid, mixed with the ashes of the

burnt weeds. Red clover has been grown here for fourteen years, and in the adjoining township of Ferrybridge for thirty years, without the land becoming what is commonly called clover-sick. It is also worthy of especial notice that the whole of this farm, although the soil is within a few inches of the limestone shale, has been subsoiled and trench-ploughed with the greatest advantage—even to the doubling of the produce. Previous to this operation the crops were burnt up with a very moderate degree of drought; but during the last two dry seasons, not a failing spot has been visible in the corn crops.”

Mr. J. H. Charnock gives the following account of the cultivation of liquorice in the neighbourhood of Pontefract:—

“There is in this locality the cultivation of one plant which, although of limited use, may be properly noticed here, inasmuch as it seems to be grown wholly on the limestone soil of this formation. I allude to liquorice, which, as every one knows, is peculiar to the neighbourhood of Pontefract, and requires a considerable depth of soil to produce it in perfection. For the information of those who are unacquainted with it, I may state that in general appearance it very much resembles a bunch of young ash saplings, growing in slender upright twigs of four or five from the same root, to about two feet in height. It is the roots only that are used; and as these are generally from two to three feet in length, an idea may be formed of the depth of soil necessary for their perfect growth. This suitable thickness of soil is met with at the side and foot of those numerous short rising grounds surrounding the town of Pontefract; and it is pretty manifest that the excess of depth has arisen either from the soil slipping down from the rise above, or from artificial causes. The mode of management, too, favours the necessary depth: when first planted it is set in a tolerably deep trench, and is subsequently earthed up, like celery, to a height of eighteen inches and two feet in the last year of its growth. It is the practice to plant cabbages in the furrows, which, from the facilities of earthing up, and the protection thus afforded them, come to perfection some weeks earlier than those in ordinary market-garden grounds. Large quantities are thus grown, and sent to Leeds and the other large towns for sale, where they meet with a ready market.”

The Trias or New Red Sandstone Formation.—To the east of the Permian formation, but with a much wider development,

is the Trias, or new red series, including the new red or bunter sandstone, and the new red or keuper marls and sandstone. This formation commences on the eastern side of England near Hartlepool, in the county of Durham, enters Yorkshire on the banks of the river Tees, runs southward through the vale of York to the Humber, and thence extends into the great central plain of England. It has generally a fine grassy soil, abounds in rather soft building stone, and contains beds of rock salt in the neighbourhood of Middlesborough. It consists of beds of red sandstone and conglomerate more than a thousand feet in thickness, and above them red and green marls, chiefly red, which in Germany go by the name of the keuper strata, and in England are called the new red marl.

In the "Geological Report" on the new red sandstone of South Yorkshire it is stated, that the pebble beds form a steep ridge with a westerly face, and from this the ground, with many undulations, slopes towards the valley of the Idle. All the ground occupied by the bunter beds has a light sandy or gravelly soil, and that of the keuper strata, when not covered by the drift, is a stiff red clay. The pebble beds and conglomerates of the bunter sandstone consist of coarse sand with pebbles, consolidated, unconsolidated, and in all stages between. The pebbles are for the most part quartz, small and well-rounded, and of various colours, white and red predominating; but besides the quartz there are pebbles and fragments of other rocks. The soil over this formation is light and poor, being chiefly sand or gravel; and part of the country over which it spreads is well known as the Forest lands, being a part of the Forest of Sherwood.

The lower soft red and mottled sandstone of this district is semi-consolidated fine sand, chiefly of a red colour, but sometimes mottled. The sand is often so fine and free from impurities as to be very valuable as a moulding sand. This formation gets very thin towards the north, on the borders of Yorkshire; its lower boundary being very uncertain, owing to the country being covered either with peat or drift sand and gravel.

The keuper formation occupies but a very small area in the southern part of the county of York. The marls and sandstones composing it are much used for brick and tile making.

The new red sandstone enters the county of York from the south in a comparatively narrow stripe, between Bawtry and Tickhill,

and intersects the whole county from north to south, forming the great vale or plain of York, down which the river Ouse carries all the waters of the other Yorkshire rivers into the Humber.

The soil at the southern extremity of the new red sandstone plain, up to Doncaster, partakes, for the most part, of that sandy-loam character which, without very much colour, sufficiently indicates the substrata. From Doncaster by Hensall, and in parts of Haddlesey, it is of a still more sandy description; so much so as, at Hensall and Heck, to drift into the hedges and ditches like snow, on a dry windy day. After leaving Tadcaster it assumes more decidedly its distinctive nature, both in colour and substance; and in the district around Goldsborough, Whixley, Green Hammerton, Ouseburn, and Boroughbridge, is marked by very superior land—both grass and arable. It is here of a much firmer and more loamy character than in the southern portion of the Riding; and being at the same time dry, and containing a large proportion of colouring—the peroxide of iron, so beneficial to vegetation—it produces the most luxuriant crops of turnips, barley, seeds or clover, and wheat. The pasture-lands, too, of this district are of a superior order, possessing feeding properties of great value, and carrying a more than usual number of stock.

As respects the cultivation throughout the range of the new red sandstone, it may, like the soil itself, be appropriately described as generally very good; without, perhaps, at the same time, having any of those more marked peculiarities of culture which would seem to call for any special notice.

The usual rotation on the lighter portions is the ordinary four-course turnip culture; the great facility which these sandy soils offer for the easy and rapid spread of twitch or couch grass, making the turnip crop every fourth year essential for the periodical eradication of this weed. Where the soil possesses more stamina, as at Bawtry and Tadcaster, and more particularly around Whixley, Green Hammerton, and Boroughbridge, a longer rotation is practised.

The barley from these latter districts is usually of very fine quality, and is consequently much esteemed by the better class of maltsters, and realizes the highest market value.

The Alluvial Lands of the West Riding.—The alluvial lands of the West Riding are of great extent, and though formerly an almost impassable wilderness, have been rendered in modern times

one of the most valuable districts in England. The alluvial soils include nearly the whole of the land along the banks of the rivers Ouse, Don, Idle, and Trent, from Selby on the Ouse to Bawtry on the Don, and from Bawtry to the point where the river Trent enters the Humber. They also include the lower part of the valley of the Derwent in the East Riding.

On those alluvial soils bordering on the new red sandstone, and within the influence of the rivers which have been previously mentioned as forming the limits of the West Riding, in addition to the usual corn and green crops, flax, teasles, woad, and carrots enter largely into rotations. Mustard is also frequently grown, and in a favourable season, when well housed, is not only a paying crop in itself, but an excellent preparative for the succeeding wheat crop. In the neighbourhoods of Goole and Selby, potatoes are cultivated very extensively on the better portions of the warp soils; and as these inland ports afford great facilities for shipping this produce to the manufacturing districts, as well as to London, and also for the return of manure, this root alternates on the same land with an oat or wheat crop, and is not unfrequently grown many years in succession.

Mr. J. H. Charnock gives the following interesting information of the warp lands of the West and East Ridings. He says:—"The really warp soils of the West Riding are not so extensive as is supposed. The great proportion is in the East Riding. Much error, I believe, exists as to the true origin of this soil. It is usually supposed to be the aluminous earth washed from the bottom; but it is now proved by the observations of Ehrenberg, corroborated by English microscopists, to be the deposit of immense quantities of infusorial animalcules. In all rivers whose course is slow and deep, animalcules breed in immense myriads; and as both the salt and fresh water have each their distinct inhabitants, which cannot live in the other water, so, on the flow of the tides, and the mingling of the salt water with the fresh, the animalcules of both are destroyed, and their bodies, with their silicious coverings, deposited in such masses, as, in many of the continental rivers, almost to render the mouths of them unnavigable in a short time."

Mr. Charnock adds:—"I was informed, by a respectable person at Selby, that for some years past his annual profit from potatoes, out of one field of nearly four acres, has been about £100; and his is no solitary instance. Two crops a year are grown, and the plan adopted

is this:—When the crop from which the sets are selected in the autumn is lifted, care is taken to house the seed-sets, and when indications of sprouting begin, to encourage the growth of the germ in a healthy state by spreading them out in a dry place. The land being well prepared and highly manured, the sets are carefully planted in February, without rubbing off the sprouts, and this forms the early and principal crop, which is ready for market in June. From this crop a sufficient number of the smaller potatoes are reserved, and the land is again set with these as soon as the first crop is off, which produce the sets for the main crop of the succeeding year.

“The early crop usually realizes from £20 to £30 per acre, according to circumstances, and is generally sold for the supply of Leeds. Carrots are occasionally grown in these districts but being esteemed a more precarious crop than potatoes, and more troublesome to manage with equally satisfactory results, their cultivation is, of course, not so extensive. It must not, however, be inferred, that the bulk of the land forming this alluvial tract is of equal quality with that just alluded to. On the contrary, a very large proportion of it is strong and wet, and, from its own level, greatly dependent on the suitableness of the season for the yield of its crops.”*

In the very able report in the *Journal of the Royal Agricultural Society of England* in the year 1861, “On the Improvements in the Farming of Yorkshire, since the date of the last report in the *Journal of Agriculture*,” Mr. William Wright observes, that the warping of the large district extending from the Trent, and Ouse, to Goole, Crowle, Thorne, and Selby, exhibits remarkable effects of skill and improvement. Some of these extensive warping works had been brought to a conclusion about that time; but another clough of larger dimensions had been put down, about eight miles above Goole in the Dutch river, by which a large area has been improved between Thorne and Rawcliffe Common; besides several other cloughs in the Dutch river, and in the rivers Aire and Ouse, annually re-warping and enriching the neighbouring lands. Mr. Wright states that a great improvement in the mode of warping was made between the years 1848 and 1861. The difficulty lay in equalizing the deposit of fertilizing mud from the river, the irregularities of which, both in depth and quality, diminished the

* Mr. Chadwick's Prize Report on the Agriculture of the West Riding.

value of the land, as the surface was raised. On the land lying nearest the drain sand predominated, in consequence of the greater size and weight of its particles; further on, sand and mud were so mixed as to make very firm soils; and the furthest portion a low-lying tenacious clay. Under the improved system, formed by changing the lines and forcing the water at the outset to the lowest and furthest portion of the land intended to be warped, the soil is equalized in quality; for wherever a low and strong deposit has been formed, the mischief is in a great measure rectified by directing the water over it with a rapid current.

The land, as Mr. Wright informs us, takes from two to three years to rewarped, according to the state of the weather in different seasons. If wet, the strong freshes in the river are unfavourable for the deposit; if dry, the deposit is great; but after a long drought it sometimes becomes of too solid a nature, and in that case acts injuriously on the crops, when the land is under cultivation. He mentions as an illustration of this fact, that the lands which were warped in the dry season of 1826, never cropped favourably for fifteen years afterwards. The best security against this defect, is to finish the warping of the land soon after the winter season is over.

Mr. Wright informs us that these works are carried out on different terms; by hire at from £12 to £24 per acre, according to the height of the land, the distance of embankment required, and the probable time during which it may be necessary to keep the land under the process. When the cloughs are the property of the landlord, in some instances the improvement is carried on entirely at his expense, the land being re-let at an improved rent when finished; in others, the rent nominally remains the same, the proprietor undertaking to raise the embankment, for the cost of which the tenant pays five per cent. During the process of warping, however, the landlord remits one-half of the rent of the land, the tenant sacrificing the other half and levelling the embankment when it is completed; but this is a very expensive mode for the tenant, and is only carried out when the most perfect confidence exists between the landlord and tenant; and no part of the county furnishes stronger proofs of the necessity of this confidence than the district where extensive works and improvements like these are carried on. After the warping is finished, drainage follows. The vast extent to which the system of warping

has been carried out on the banks of the Humber, the Ouse, and other Yorkshire rivers, is a striking proof of the energy of the district.*

On the Fens and Submarine Forests of South Yorkshire and Lincolnshire.—In a paper on the origin of the fens of South Yorkshire and Lincolnshire, read before the British Association at its meeting at Leeds in the year 1858, by the Rev. Edward Trollope, the author attributed their formation to small and slow changes in the level of the land, produced by internal action of a volcanic character, such at that which is gradually raising the level of the land in a great part of Sweden and some other countries. In the case, however, of the Yorkshire fens, he discovered evidence of a double action, at one time raising, and at another depressing, the level of the land.

The author observed, that a great contest between sea and land, leading to frequent changes in their respective boundaries, had certainly been in progress upon these coasts for centuries before the arrival of the Romans in Britain, and at a period before written records began to be kept. The ocean had from time to time swept far beyond its present limits; and yet, little by little, it had by its very fury aided to form a future barrier against itself by the accumulation of the silt left upon its retreat, in concert with the earthy deposits caused by the continual flow of the inland waters. At one time the sea had lorded it over a considerable portion of the eastern coast; but afterwards fresh water became in the ascendant, and has left the mark of its reign behind it in the form of a soapy blue clay, varying in tint, and abounding in fresh-water shells.

The ocean, however, occasionally gave battle to the fresh water, as was shown by the existence of channels filled with marine silt, running up into the blue clay. In this stratum grew trees of various kinds, as oaks of vast size, firs, alders, birch, and hazels, whose roots were yet firmly fixed in the soil, while their innumerable trunks lay prostrate beneath the black peaty earth, composed of decayed vegetable matter. It might safely be assumed that the period of the growth of these trees lasted for five centuries. How long these fen districts continued to be covered with stagnant fresh water after they had wrought such terrible ruin upon thou-

* Journal of the Agricultural Society, vol. xxi., 1861, article v., "On the Improvements in the Farming of Yorkshire since the date of the last Reports in the Journal." By William Wright, Sigglesthorne Hall.

sands of acres of the finest forest lands, was not deducible from any internal evidence; but they certainly were for the most part still prevalent when the Romans appeared upon the scene. They proceeded to encircle the coast with a vast sea bank, to deepen and defend the outfalls of the rivers, and to construct drains. But besides the coastal line of fen-lands, there were vast tracts in the interior of Lincolnshire of a similar character, forming, in the aggregate, 522,000 acres, lying from four to sixteen feet below high-water level. The largest of these extended from the Trent, through the Isle of Axholme, into Notts, and far into Yorkshire, in the direction of Doncaster. It might fairly be assumed that, during the Roman occupation, this vast tract of fen-land bore quite a different character to what it had since done: that it had a gravelly subsoil, and an ordinary earthy surface, covered with trees; not usually, if at all, subject to floods; but that, subsequently, it became more or less constantly submerged, so as to destroy its previous forest growth, and to cover the bodies of the former vegetable giants of the district beneath an earthy deposit.

This great change had usually been attributed to the burning of the forests by the Romans, on account of the covert which they afforded to swarms of suffering Britons. There were apparent signs of burning about the stumps of some of the trees, but others had clearly been cut down, and many had been torn up by the roots. The felled trees would never have so impeded the flow of the inland waters as to convert an immense district of previously dry land into a permanent swamp, as had been suggested; he would, therefore, endeavour to find another solution of this difficulty in connection with a still more remarkable fact, namely, the existence of the remains of a submarine forest off the present Lincolnshire coast. Along the shore of that country, from Sutton to Cleethorpe, many banks or islands were from time to time exposed to view. These were usually covered with silt; but when occasionally stripped of that marine deposit, they were found to possess a substratum of moory vegetable soil, filled with the roots of prostrate trees of very large size, accompanied by their berries, nuts, and leaves. Two questions arose in connection with these facts, namely, When were these districts severally submerged by fresh and salt water?—and by what agency? Various theories had been advanced for the purpose of solving these problems, the principal of which were:—1st, The interference of the Romans

with the natural drainage; 2nd, a change in the coastal line through the action of the sea; 3rd, the agency of earthquakes, or rather slow internal movements, causing subsidence of the earth. The author examined in succession each of these theories, and gave his opinion in favour of the last.

He referred to the existence of other submarine forests at various points of the shores of Scotland, England, and Wales. He observed that this theory might seem to be more marvellous than the preceding ones, and therefore less likely to be true in the opinion of those who were unacquainted with geology; but when, from the study of that science, they found that certain strata, the undoubted deposit of water, were now upheaved far above the reach of that element, and that large tracts of land had sunk beneath it, they could only regard such changes as one of the usual, but always wonderful, operations of nature.

The author cited other instances of similar phenomena, and in conclusion said that he was inclined to think, that a slow upward movement had begun to take place in large districts of Lincolnshire long ago, and that by means of carefully conducted scientific observations this would hereafter be certainly proved and accurately measured.

The filling up of channels and estuaries of large size that formerly existed, and the rapid growth of its coast at various points, apparently indicated this; while the known gradual, but continually increasing elevation of the Danish coast and parts of Norway greatly strengthened such a supposition.

General View of the Agriculture of the West Riding, and of its Progress since the previous Report of 1799.—Mr. Charnock makes the following observations on the subject of the progress of agriculture, in the West Riding of Yorkshire, in the earlier half of the present century. He says:—"Remembering how considerable a portion of the West Riding is within the influence of the several large towns, it will readily be conceived that the average size of holdings will be small. In their immediate vicinity the occupations seldom exceed from ten to fifty acres, and throughout the manufacturing portion of the Riding generally, from thirty to fifty acres may be considered about the usual quantity in one hand. In the more agricultural parts, farms of from 300 to 500 acres are occasional; but more commonly they run from 100 to 200 acres; the majority, however, being from eighty to 100 acres. Notwithstanding the

average annual value of the Riding is computed at only about 17s. 7d. per acre, a great portion of the better land realizes a much higher price. In the neighbourhood of the towns—a rental of from £3 to £5 per acre is paid; and even in the rural districts, the better land fetches from 25s. to 30s. per acre. Much even of the strong and wet low land realizes from 15s. to 20s. per acre, though very dear at that rent, in its present state. The moorlands probably bring from 1s. 6d. to about 5s. per acre, according to the condition of the land. But even in these districts the dry and inclosed lands will let for from 18s. to 25s. per acre. Thus I esteem 17s. 7d. per acre rather an under average value.

“The improvements effected in the farming of the West Riding since the report of Mr. Robert Brown in the year 1799, is the next head of our subject. And when we reflect that since the commencement of the present century, the population of this important Riding has more than doubled, it certainly is neither an uninteresting nor unprofitable matter for inquiry, in what proportionate ratio the cultivation of its soil has improved within the same period, in order to provide an adequate increase of supply for such an increase of consumers. Speaking of the farming of the West Riding at the time when he wrote, Mr. Brown says, 1st, ‘From Ripley to the western extremity of the Riding, nearly the whole of the good land is kept under the grazing system, and seldom or never ploughed; while corn is raised upon the inferior or moorish soils. During the time we were in that part of the country we hardly ever saw a plough, and a stack of corn was a great rarity. Upon the higher ground there are immense tracts of waste, which are generally common amongst the contiguous possessors, and pastured by them with cattle and sheep. 2nd, The land in the vicinity of manufacturing towns: the greatest part of the ground is there occupied by persons who do not consider farming as a business, but regard it only as a matter of convenience. The manufacturer has his inclosure, wherein he keeps milch cows for the use of his family, and horses for carrying his goods to market, and bringing back raw material. 3rd, The corn districts, or those parts of the Riding where tillage is principally attended to, and grass only considered as a means of bringing the corn husbandry to perfection: if we run an imaginary line from Ripley, southward by Leeds, Wakefield, and Barnsley, to Rotherham, we may affirm that the greatest part eastward of it, till we come to the banks

of the Ouse, which separates the West from the East Riding, is principally employed in raising corn. About Boroughbridge, Wetherby, Selby, &c., about one-half of the fields is under the plough; farther south, about Pontefract, Barnsley, and Rotherham, there are two-thirds; and to the eastward of Doncaster to Thorne and Snaith, three-fourths of the land are managed in a similar way. 4th, The common fields: these are scattered over the whole of the last division, but are most numerous in that part of the country to the eastward of the great North Road from Doncaster to Boroughbridge. It is impossible even to guess at the quantity of land under this management; in general, it may be said to be extensive. 5th, The Moors: these, besides the large tracts in the first division, lie in the western part of the Riding, and perhaps contain one-eighth part of the district. Upon them sheep are chiefly bred, and afterwards sold to the graziers in the lower part of the country.'

"Mr. Brown further adds, 'Betwixt Hatfield and Thorne there are great quantities of waste land, and much under water. Upon the whole, the land we have seen to-day stands in the greatest need of improvement, which cannot be done without a previous division.' This was very true, and in due time these suggestions were carried into practice. This very district, by an Act in 1811, was inclosed, and an extent of something like 15,000 acres of excellent land brought into profitable cultivation.

"Since that period, too, almost every other open common in the Riding has been inclosed, as well as most of the low waste lands, which at that time were very considerable. Attention has more recently been turned towards the inclosure of the moorlands, and especially in those districts where population has settled and manufactures have been established. And, thanks to the General Inclosure Act, a few more years, and a few more mouths requiring to be filled, will conduce not only to the remaining lowland commons being divided, but to the inclosure of a very large proportion of the moorland districts. Every year adds some additional example.

"Thus it is clear that, with this greater area under cultivation, the gross product of the Riding must have materially increased, if only from this cause; but it is equally manifest that improved cultivation of much of the old inclosed lands has added very considerably to the general increase of production; and it is not, I

think, any exaggeration to estimate the average increase of wheat per acre on these lands at present from eight to ten bushels, since the period of Mr. Brown's report. Taking the total area of the Riding at 1,648,640 statute acres, it is probable that the following apportionment will, in round numbers, approximate sufficiently near to the actual quantities under the respective heads, viz. :—

	Acrea.
Grass land,	720,000
Arable land,	680,000
Moor and waste land,	200,000
Woods and commons,	48,640
	1,648,640*

“Of these 680,000 acres of arable it will, perhaps, be within the mark to affirm that 100,000 have been brought into cultivation since 1799. If then we compute the produce of wheat at that period, on an area of one-third of the 580,000 acres then under the plough, at an average yield of twenty-two bushels per acre, we shall get a total produce of about 4,250,000 bushels per annum; against a produce now, computed in the same manner, with an average of thirty bushels per acre, of about 6,800,000 bushels. When, however, we take into account that wheat is now being grown upon the lighter lands, many of which at the earlier periods of cultivation were not considered capable of growing it at all, we may fairly estimate the increased produce of wheat now at two-thirds more than at the commencement of the present century.

“The increase, too, in the other corn crops will bear a proportionate ratio, or even perhaps somewhat exceeding this. There is also a considerable increase of animal food, consequent upon improved cultivation; but I do not think that it is to a proportionate amount, or that it at all bears such an adequate ratio to the improved culture as it ought to be.”

Reclamation of Waste Lands in the West Riding.—On the subject of the reclamation of waste lands of the West Riding, Mr. Charnock observes, in his report, that it has already been noticed that on lands of the millstone-grit formation abundant evidence exists, in the productiveness of those inclosures that have already been subjected to cultivation, of what a large portion which is yet unreclaimed is capable. He says :—“I know many instances

* These are merely approximate estimates; the official returns for the last two years will be found at the close of this chapter.

where tracts of this higher land are to be seen growing nothing but heather, and not realizing more than about 1s. 6d. per acre (shooting included); whilst immediately adjoining, on the same level, are cultivated plots that let for 20s., 25s., and up to 30s. per acre, and produce excellent crops. As I have already said, there is no great proportion of peat on these lands in the West Riding, and consequently their reclamation would be the sooner accomplished. After the drainage work is completed, which is the first thing to be done, probably the best plan of proceeding is to plough the land, turning down as much of the ling as possible (without paring and burning it, as is too often practised), lime it and sow it with rapes, and eat them on with what sheep you can get; after which, plough it and prepare it as thoroughly as possible, burning, if you like, at this stage, any stalks of ling that may come to the surface, and plant it with potatoes; after this, with a further liming (for it is generally deficient in this mineral), sow it with oats or wheat, as you may find suitable, and clover or seeds to be eaten on. There is nothing expensive in this mode of proceeding, and the potato crop will, in most instances, fully repay all the previous outlay; nay, even occasionally including a considerable proportion of the cost of drainage. No doubt, for a time, you have an inferior climate to contend with; but were it possible at once to drain the whole of these districts, this objection would, in a very manifest degree, disappear.

"The badness of the climate arises from an excess of exhalation, consequent upon an excessive surcharge of water in the land. The fact of the climate being made good by drainage has been often exemplified in the low lands, in the Fens, for instance, where ague—once so prevalent—is now never heard of; and many instances of the same effect might be given in more limited localities.

"I heard an intelligent farmer state that, since he entered on his occupation, the whole has been thoroughly drained; that on his first coming he found most of his neighbours' crops, on the higher ground around him, reached maturity a full fortnight before those on his farm; but that since the drainage has been completed his crops are invariably a week or two earlier than those in the immediately adjoining district. I refer to Mr. Moor, of Ackworth, near Pontefract, whose farming is an example to that locality.

"After taking a course or two of corn crops from the reclaimed land of these moor districts, so as to bring it into a proper tilth,

and to completely eradicate the heather, it would, if well laid down with a proper selection of permanent grasses, make good pasturage for young stock; and probably, with a little attention, in a few years become really good grass land, and capable of carrying a considerable number of both beasts and sheep."

With regard to the cultivation of high lands of the West Riding, Mr. William Wright observes, in his Report on the farming of Yorkshire in 1861, that these lands, when improved, are chiefly devoted to pasture; they are limed and manured from the populous districts of the valleys, and have attained a surprising fertility, which would put to the blush many farmers who have far better land, in situations more favourable to the growth of grasses and cereals. Mr. Wright says, "Some excellent farming is found about Sheffield, and we have noticed great improvements about Harrogate; but the high land in the West Riding available for agriculture is limited in extent. Operations are commenced by draining, without which ploughing would be vain; roads are then made over these hitherto wild tracts, fields inclosed, farmhouses built, and where a few years ago the sportsman wandered in quest of wild game, crops of corn are now found, with the usual accompaniments of cultivation."

On the limestone hills in the Craven district, great attention is given to the improvement of the grass land. The consumption of animal food, milk, butter, bread, and other necessities of life, is very large and rapidly increasing in the West Riding. Wakefield, Leeds, Rotherham, Doncaster, and Pontefract, furnish the chief weekly markets, where the corn, cattle, and sheep from the other Ridings find ready purchasers; the railways offering great facilities for the conveyance of these articles from the most distant farms and districts.*

Cattle and Sheep of the West Riding.—As respects the stock and breed of cattle generally throughout this Riding, it has been much less attended to than in either of the others. In the middle and eastern parts the horses are of a pretty good size, and in one or two localities which are favoured by circumstances, some better animals are bred. The districts around Doncaster, Wetherby, and Ripon are those chiefly to be noticed, for the production of horses, particularly hunters, of good breeding and power. The draught horses, which are usually employed both for

* Journal of the Agricultural Society, vol. xxi., 1861, article v., "On the Improvements in the Farming of Yorkshire since the date of the last Reports in the Journal." By William Wright.

agricultural and commercial purposes, are of mixed breeds, and not unfrequently selected without much regard to their appropriateness for the work. Those in the western parts are commonly small, yet active and hardy, but are of no distinct breed. Of horned cattle, the short horns and the Craven long horns are the only distinctive breeds—the first, in the middle and east parts of the Riding; and the other, almost wholly confined to their native district in the west. There are, however, a great variety of cross breeds of a most incongruous character spread over the whole Riding; and when we consider the great number of Irish beasts that have of late years found their way here, and how many of these have been domiciled and bred from, there cannot be much surprise at the *mélange* that exists. It has for some years, too, been the practice of the resident landowners, and the better class of farmers, to keep in their herds one or more Channel Island cows; and the fashion has also prevailed to some extent amongst the wealthier manufacturers, who, having their residences in the suburbs of the towns, have deemed their domestic arrangements incomplete without an Alderney cow or two.

The West Riding, when Mr. Charnock wrote his Report in 1848, possessed some few breeders of short horns, whose stock was deserving of notice. Amongst these were Earl Fitzwilliam, Mr. Wentworth, Mr. Fawkes, Mr. Cator, Mr. Stansfield, Lady Ramsden, and Mr. Crawshaw of Byram. More attention of late years has been given to the breed of sheep, particularly in the turnip districts of the Riding, by the introduction of the Leicester, the improved Lincolnshire, and South Down breeds; and also by a breed between the Leicester and Lincolnshire, from the Yorkshire wolds. A better description of moorland breed has also been established. Perhaps the most prevalent system is to purchase the Border or Bamfroughshire ewes, or the Cheviot, and cross them with a good Leicester tup, sell the lambs fat to the butcher, take the clip, and fatten the ewes in the autumn. Where a regular flock of sheep is not kept, this plan is probably as good and profitable as can be pursued; the peculiarly good suckling properties of the ewes, and their aptitude to fatten, making both the lambs and themselves early fit for market. Many of the half and better bred moorland sheep are annually fattened on the pastures of the lower lands; and from the general desire of the richer classes, both in the country and the towns, to procure this smaller description of mutton, they usually command a somewhat higher price per head to the butcher in pro-

portion to their weight. The breed of pigs in the Riding is particularly good, both of the large and small kinds, many of the best breeders living within its limits. Some of the more celebrated of these are, Dr. Hobson, of Leeds, Mr. John Hannam, of Deighton, Mr. Nutt, of York, and others. Very few, if any, of the black kind are bred.

Agricultural Labourers in the West Riding.—With regard to agricultural labourers of the West Riding, Mr. Charnock observes, “If in alluding to the condition of the agricultural labourer of the West Riding, we say that there is, perhaps, no district in the kingdom in which he is better paid, better housed, and better cared for, it would only be doing common justice both to him and his employers; but, I believe, if we go one step further, and say that he is in many respects better off, and more completely independent than they are, the truth will not have been exceeded. The general wages of the common labourers are from 14s. to 16s. per week; and in those occupations requiring somewhat more of judgment and skill in manipulation—in drainage, for instance—they expect to earn 18s. per week, and upwards. In the cheapness and excellency of fuel throughout almost the whole Riding they possess a very great additional comfort and advantage over those of their class in many of the more southern counties; and which certainly fully compensates for the higher house rents which they pay in the north. The women and the older children generally obtain as much employment, both on the farms and in other ways, as they can spare time from their domestic occupations to attend to. Their wages are usually from 8d. to 1s. per day, most commonly the latter.

“From the number of applications from this Riding, and from the county generally, for advances under the Drainage Acts, there is every probability of the able-bodied, who are capable of such work, being fully employed for some years to come. And it is not only these drainage-works, but many other proprietors are draining extensively, and all who desire to let their land or retain good tenants must do the same; for the time is at hand when the first question asked by those about to occupy strong land will be, ‘Is it thoroughly drained?’”

Agricultural Resources of the West Riding.—The agricultural returns of Great Britain laid before Parliament by order of her Majesty, in the year 1870, furnish us with much information as to the cultivation of each of the three Ridings, and of the whole

county of York. From the great variety in the soil, the climate, the markets, and the amount of population of the three Ridings, the systems of cultivation vary very greatly in different districts, as will be seen from the following summary of the agriculture of the West Riding, and the subsequent accounts of that of the East and West Ridings.

Agriculture of the West Riding, according to the Returns Published in 1870.—The total area of the West Riding in statute acres is given in this return, as 1,709,307 acres. This is somewhat less than the area as ascertained in the Ordnance survey, which amounted to 1,768,380. The difference arises from the circumstance of the registration unions on which the agricultural returns are founded, not corresponding exactly with the boundaries of the county.

In the West Riding the total number of acres of land which were under all kinds of crops, bare-fallow, and grass, amounted in 1868 to 1,128,211 acres, and in 1869 to 1,140,871 acres. The remaining part of the land of the West Riding consists either of heath or mountain pasture; or of very small holdings chiefly around towns and populous villages; of the land on which those towns and villages are built; or of space in bays and estuaries, which is returned along with the land of the district, though usually covered with water. Each of these kinds of land covers a considerable area; but no doubt much the largest portion of the land not given in these returns, consists of the heath-covered hills and mountains on the western side of the Riding, many of which rise to an elevation of from 1000 to 2500 feet above the level of the sea, and are exposed to the storms and the heavy rains of the Atlantic. Very little of this land is suitable for arable purposes, and over a considerable portion of it the natural herbage consists of heath, and not of the finer grasses.

In addition to the heath and mountain land, there is in the West Riding a large quantity of permanent pasture or grass land, which feeds large quantities of stock, and is never broken up in any rotation of crops. The whole quantity of permanent pasture or grass land of this description is given in the returns for 1868 at 659,333 acres, and in 1869 at 685,438 acres. Thus it will be seen that pasture land of this description forms upwards of a third part of the area of the West Riding, whilst heath and mountain land forms not much less than another third. Including the permanent pasture, the total acreage under all kinds of crops, bare

fallow, and grass, in the West Riding, amounted in 1868 to 1,128,211 acres, and in 1869 to 1,140,870 acres.

Nearly two thirds of the land of the West Riding being thus taken up with pasture, the quantity of arable land is necessarily small. The extent of land under corn crops in the West Riding in 1868, was 254,131 acres, and in 1869, 268,154 acres. The quantity of land under green crops was 95,979 in 1868, and 104,643 in 1869. The quantity under clover and grasses in rotation was 91,261 acres in 1868, and 59,034 in 1869. The falling off in the extent of clover and other artificial grasses in 1869, was probably owing to the excessive and almost unparalleled dryness of the summer of 1868, which rendered it impossible for the seeds to germinate after they were sown.

The grain most extensively cultivated in the West Riding is wheat, though only about a fourteenth or fifteenth part of the land of the Riding is sown with that grain. The acreage of wheat in 1868 was 109,236, and in 1869, 114,119 acres. In the same two years, the quantity of barley sown in the West Riding was 66,406 and 66,281 acres; the quantity of oats was 59,850 and 60,859 acres; the quantity of rye was 1474 and 2171 acres; the quantity of beans was 11,892 and 15,160 acres; the quantity of peas was 5273 and 9564 acres. Including the whole of the above varieties of corn, the total quantity of land under corn crops in the West Riding, in the year 1868, was 254,131 acres, and in 1869, 268,154 acres. These returns do not give any averages of the yield of the corn crops per acre, and we are therefore unable to speak with confidence as to the number of persons whom the corn lands of the West Riding serve to maintain. Fortunately, we have better data as to the number of the domestic animals which are sustained by the produce of the soils.

Every kind of root cultivated in the fields of England is grown in the West Riding. The number of acres of potatoes raised, in 1868, was 23,483 acres, and in 1869, 28,778. The breadth of turnips and swedes grown in the former year was 64,330, and in the latter, 62,221. The quantity of mangold in the former year was 950 acres, and in the latter, 1819; of carrots 83 acres in the former year, and 143 in the latter; and the quantity of cabbage, kohl-rabi, and rape was 1723 acres in the former year, and 2683 in the latter. In addition to the above, there was raised in the same two years, of vetches, lucerne,

and other green crops, except clover or artificial grasses, 5410 acres in 1868, and 8899 acres in 1869. There was also grown, in the West Riding, a larger quantity of flax than was raised in any other district of England; namely, 3355 acres in 1868, and 4074 in 1869. In addition to these, there were grown of clover, sainfoin, and grasses, under rotation, 91,261 acres in 1868, and 59,034 in 1869.

The whole of the produce of the West Riding, together with an immense quantity of grain and other articles produced elsewhere, was required for the support of the inhabitants of the Riding, with their cattle, sheep, horses, and other animals. The number of sheep in the West Riding of Yorkshire was very large, amounting in the year 1868 to 823,214, and after the terrible drought of 1869 to 735,900. The number of cattle was also large, amounting in the former year to 231,996 head, and in the latter year to 222,789. The number of horses was also very large, amounting in the year 1869 (the first year for which the return was made) to 60,742, in the possession of farmers alone, and in the whole county to upwards of 140,000; being the seventh or eighth part of the horses in England, as shown in the parliamentary return.

PROGRESS OF POPULATION ON THE AGRICULTURAL DISTRICTS OF THE WEST RIDING,
ON THE MAGNESIAN, NEW RED SANDSTONE, AND ALLUVIAL FORMATIONS.

District.	Area in acres.	Population.			Num. of persons to square mile.
		1801.	1851.	1861.	1851.
Pontefract, . . .	66,135	17,967	29,937	34,794	290
Hemsworth, . . .	33,870	6,198	8,158	7,793	154
Doncaster, . . .	109,031	20,757	34,675	39,388	204
Thorne,	71,946	10,583	15,886	16,011	141
Goole,	40,908	6,700	13,686	15,153	214
Selby,	53,764*	10,252	15,672	16,001	184
Tadcaster, . . .	78,301	14,523	17,983	18,118	163
Knaresborough, .	39,942	19,403	15,473	17,176	205
Ripon,	84,214	13,145	18,648	16,041	142†

* The limits of the Selby district in the census of 1861 were altered to 56,014 acres; those of Tadcaster, to 63,796; and those of the Ripon, to 70,590. New districts were also made of Great Ouseburn, extending over 51,808 acres, containing 12,167 persons in 1851, and 11,534 in 1861; also a new district of Wetherby, extending over 32,459 acres, and containing, in 1851, 6518 persons, and in 1861, 6668; and also a new district of Kirk Deighton, extending over 6941 acres, containing, in 1851, 1012 persons, and in 1861, 978 persons. See Census Return, 1861, England and Wales, vol. i., pp. 598.

† England and Wales:—Registration district, number of persons to a square mile in registration district. Census of Great Britain, 1851. Table 21, p. 111.

Value and Increase of Property in the West Riding of Yorkshire, from 1860 to 1870.—We have shown in the above details what are the principal sources of wealth and employment at present existing in the West Riding of Yorkshire. These, it has been seen, are derived from the cultivation of the soil; from large supplies of coal, iron, lead, and other metals and minerals extracted from its bosom; and from extensive manufactures, giving employment to many hundred thousand persons, together with a large portion of the machines and implements which give so vast a productive power to the industry of the British manufacturer. In concluding this account of the natural resources of the West Riding, and of the industrial purposes to which they are applied, it may be well to show what portion of the wealth of the country is derived from these resources, and how far the wealth and employment supplied by them have increased during the last ten years. One of the best methods of exhibiting these results is to give a comparative view of the income and property of the West Riding, as shown by the official returns of the Income and Property Tax under the three great schedules, A, B, and D. These show the whole of the property derived from incomes of £100 and upwards. The amount derived from smaller incomes can only be matter of estimate, as there are no returns which show it; but the aggregate annual amount must reach many millions, and must be highest in those districts in which labour is best rewarded. Fortunately there is no distinct and no extensive occupation in Yorkshire in which the amount of wages earned is not sufficient for the comfortable support of the people.

Annual Value of Property in the West Riding of Yorkshire in the Year 1860.—A parliamentary return was made in the year 1860 of the gross annual value of property assessed under the Property and Income Tax Acts, for the three great schedules, A, B, and D, in each parish in England, and Wales, and in Scotland, for the year ended the 5th day of April, 1860. Under Schedule A was included an account of the value of lands, messuages, tithes, manors, fines, quarries, mines, ironworks, fisheries, canals, railways, gasworks, and all other property and profits not comprised in other schedules. Under Schedule B was included farming profits; and under Schedule D, the profits derived from trade and commerce. The aggregate sums returned under each of these headings, from the different collecting districts of the West Riding of Yorkshire, were as follows, in 1860 :—

A STATEMENT OF THE ANNUAL VALUE OF PROPERTY AND PROFITS ASSESSED UNDER SCHEDULES A, B, AND D, OF THE INCOME TAX IN THE WEST RIDING OF YORKSHIRE. IN THE YEAR ENDING 6TH APRIL, 1860.

	Total Gross.	Gross.	Net.
	Annual Value of Property Assessed under Schedule A.	Annual Value of Property Assessed under Schedule B.	Amount of Profits Charged under Schedule D.
Agbrigg, Lower,	£ 409,380	£ 117,696	£ 254,252
Agbrigg, Upper,	456,583	109,981	501,092
Barkston Ash,	162,654	122,900	38,550
Claro,	288,083	225,020	76,351
Doncaster, Borough,	62,499	17,458	58,807
Division of Leeds, Borough,	683,668	38,215	1,104,416
Morley, East,	774,834	90,801	907,638
Morley, West,	515,588	111,633	531,807
Osgoldcross, Lower,	113,176	88,750	24,717
Osgoldcross, Upper,	104,675	74,300	27,787
Pontefract, Borough,	18,521	5,250	20,319
Ripon, City,	20,031	4,143	25,745
Ripon, Liberty,	57,031	43,374	7,301
Sheffield, Borough,	566,525	27,868	783,901
Skyrack,	238,407	122,705	113,813
Staincliffe, East,	237,580	150,374	100,648
Staincliffe, West,	190,958	167,792	31,539
Staincross,	277,072	108,435	138,658
Strafforth and Tickhill, Lower,	155,526	130,724	22,240
Strafforth and Tickhill, Upper,	426,104	162,925	145,507
Total,	5,758,895	1,940,544	4,924,088

TOTAL PROPERTY RETURNED IN THE WEST RIDING IN THE YEAR 1860.

Property returned under Schedule A,	£5,758,895
Property returned under Schedule B,	1,940,544
Property returned under Schedule D,	4,924,088
	<u>£12,623,527</u>

The total annual value of property in the three Ridings of Yorkshire was as follows, in 1860 :—

Property returned under Schedule A,	£9,620,962
Property returned under Schedule B,	4,127,601
Property returned under Schedule D,	6,147,149
Total value,	<u>£19,895,712</u>

Increase of Property of Yorkshire, from 1860 to 1869.—The increase of the value of property and profits in the West Riding of Yorkshire, as well as in the whole county, was extremely rapid in the nine years which intervened between 1860 and 1869. The following table will show the amount of increase in each of the collecting districts of the West Riding during the same period, as well as the increase in the whole of the county of York :—

A STATEMENT OF THE ANNUAL VALUE OF PROPERTY AND PROFITS ASSESSED UNDER SCHEDULES A, B, AND D, OF THE INCOME TAX IN THE WEST RIDING OF YORKSHIRE FOR THE YEAR ENDING 6TH APRIL, 1869.

Names of Divisions.	Gross Annual Value of Property assessed under Schedule A.	Gross Annual Value of Property assessed under Schedule B.	Net amount of profits charged to duty under Schedule D.
	£	£	£
Agbrigg, Lower,	512,417	137,308	556,858
Agbrigg, Upper,	620,671	117,575	820,465
Barkston Ash,	187,917	138,261	50,823
Claro,	330,719	252,056	89,655
Doncaster Borough,	79,020	18,439	84,425
Leeds, Borough,	929,644	42,472	2,087,738
Morley, East,	985,573	118,735	1,942,690
Morley, West,	652,273	114,152	995,490
Osgoldcross, Lower,	135,068	102,377	38,388
Osgoldcross, Upper,	127,780	78,822	31,444
Pontefract, Borough,	19,450	5,132	27,689
Ripon, City,	24,801	4,775	31,349
Ripon, Liberty,	56,635	47,892	9,256
Sheffield, Borough,	811,637	24,689	1,374,499
Skyrack,	316,669	140,297	246,813
Staincliffe, East,	268,189	150,377	193,063
Staincliffe, West,	221,386	193,725	56,600
Staincross,	227,939	113,927	307,073
Strafforth & Tickhill, Lower,	172,293	141,296	27,174
Strafforth & Tickhill, Upper,	364,723	175,262	356,317
Total,	7,050,804	2,117,569	9,327,810

* It is to be observed, that, under the provision of the Act 29 Vict. c., 36, the profits of Railways, Mines, Ironworks &c., were, in the year 1866-67, transferred from Schedule A, to Schedule D.

TOTAL PROPERTY RETURNED IN WEST RIDING IN THE YEAR 1868-69.

Property returned under Schedule A,	£7,050,804
Property returned under Schedule B,	2,117,569
Property returned under Schedule D,	9,327,810
	<u>£18,496,183</u>

The total annual value of property in the three Ridings of Yorkshire in the year 1868-69, was as follows:—

Property returned under Schedule A,	£11,048,384
Property returned under Schedule B,	4,592,609
Property returned under Schedule D,	13,540,589
	<u>£29,181,582</u>

INCREASE OF PROPERTY IN THE WEST RIDING.

Property in 1868-69,	£18,496,183
Property in 1860,	12,623,527

Increase from 1860 to 1869, £5,872,656

INCREASE OF PROPERTY IN THE COUNTY OF YORK.

Property in 1868-69,	£29,181,582
Property in 1860,	18,496,183

Increase from 1860 to 1869, £10,685,399

OFFICIAL LIST OF THE YORKSHIRE COLLIERIES AND THEIR
OWNERS, 1869-70.

BY

HER MAJESTY'S INSPECTOR, FRANK N. WARDELL, ESQ.

Name of Colliery.	Where situated.	Owner's Name.
Cullingworth,	Bingley,	Edward Townsend.
Denholme,	"	Thomas Horsfall & Co.
Do.	"	Edward Townsend.
Norr Hill (Wilsden),	"	Baxandall & Co.
Shipley Moor,	"	Briggs & Sons.
Wilsden,	"	Wood & Son.
Agnes,	Barnsley,	William Day.
Blacker Main,	"	Blacker Main Coal Co.
Bloomhouse Green,	"	Henry Lodge.
Church Lane (Dodworth),	"	Messrs. Charlesworth.
Darfield,	"	Darfield Main Coal Co.
Darley Main,	"	Croft & Co.
East Gawber,	"	Craik & Co.
Ellis Laith,	"	Leather & Littlewood.
Edmund's Main,	"	Mitchell & Co.
Furnace Main,	"	Adshead & Co.
Gawber Hall,	"	Messrs. Greaves.
Haigh,	"	Fountain & Son.
Hall Royd (Silkstone),	"	Haynes & Co.
High Royd and Elsecar,	"	Hall & Co.
Hoyland and Elsecar,	"	Wells & Co.
Lundhill,	"	Lund Hill Coal Co.
Moor House,	"	Fountain & Son.
Monk Bretton,	"	Monk Bretton Coal Co.
Mount Osborne,	"	William Day.
New Gawber Hall,	"	Sturges, Paley, & Co.
North Gawber,	"	Thorp & Co.
Oaks,	"	Barber & Co.
Old mill,	"	William Day.
Old Silkstone,	"	R. C. Clarke.
Old Silkstone Main,	"	Cooper & Co.
Pinder Oaks,	"	Croft & Co.
Rockley Coal and Ironstone,	"	Cooper & Co.
Silkstone Fall,	"	Adshead & Co.
Silkstone New, or Higham,	"	Messrs. Charlesworth.
Swaithe Main,	"	Sutcliffe & Co.
Strafford,	"	Mitchell & Co.
Swallow Hill (Darton),	"	Smith & Co.
Victoria,	"	Pickles & Co.
West Gawber,	"	Joseph Emsley.
West Silkstone,	"	Kirsop & Bainbridge Brothers.
White Hill or Penny Pie (Dodworth),	"	Messrs. Greaves.
Wharnciffe Silkstone,	"	Wharnciffe Silkstone Coal Co.
Willow Bank,	"	Thorp's Executors.
Wombwell Main,	"	Wombwell Main Coal Co.
Woolley,	"	Woolley Coal Co.
Worsborough Park,	"	Cooper & Co.
Allerton,	Bradford,	Bowling Iron Co.
Do.	"	Wood & Son.
Aycliffe Hill (Horton),	"	Rushworth & Co.
Birkby Lane,	"	Robertshaw & Co.
Bolton Wood,	"	Handforth & Co.

YORKSHIRE COLLIERIES.—*Continued.*

Name of Colliery.	Where situated.	Owner's Name.
Booth Holme Field (Tong), . . .	Bradford,	Holliday & Clough.
Bowling,	"	Hird, Dawson, & Hardy.
Do.	"	Joseph Beanland.
Do.	"	Bowling Iron Co.
Do.	"	E. Gittins.
Bradford,	"	Bowling Iron Co.
Broom Hall,	"	Thomas Pitts.
Bunkers Hill,	"	Bowling Iron Co.
Clayton,	"	Barstow & Co.
Cleckheaton,	"	Bowling Iron Co.
Do.	"	Hird, Dawson, & Hardy.
Clifton,	"	Do.
Cotton Hole (North Bierley), . . .	"	B. Collingham.
Cutler Height,	"	Hird, Dawson, & Hardy.
Dog Lane,	"	G. Mortimer.
Eccleshill,	"	Thomas Tomlinson.
Haycliffe Hilt (Horton),	"	John Bottomley.
Heaton,	"	Briggs & Sons.
Do. (Shipley),	"	George Heaton.
High Bank (Shipley),	"	Beck & Co.
Holme Bank,	"	Hird, Dawson, & Hardy.
Hunsworth,	"	Bowling Iron Co.
Laister Dyke,	"	Joseph Cliffe & Son.
Little Horton,	"	Charles North.
North Bierley,	"	Bowling Iron Co.
Do.	"	Hird, Dawson, & Hardy.
North Cliff,	"	Shipley Fire Clay Co.
Norwood Green,	"	John Baistow.
Rockwell,	"	Smith & Co.
Scholes,	"	Hird, Dawson, & Hardy.
Seventeens (Clifton),	"	Bowling Iron Co.
Shelf,	"	Hird, Dawson, & Hardy.
Do.	"	Bowling Iron Co.
Shipley,	"	Airedale Brick and Tube Co.
Shipley Moor,	"	William Frith.
Smedles (Bowling),	"	John Crowther.
Thornton,	"	William Illingworth.
Do.	"	Townsend & Co.
Do.	"	Wood & Son.
Do. Road,	"	Charles North.
Tong,	"	Hird, Dawson, & Hardy.
Do.	"	S. Broadbent.
Do.	"	Bowling Iron Co.
Wibsey,	"	Charles North.
Wike,	"	Hird, Dawson, & Hardy.
Babes in the Wood,	Dewsbury,	Crawshaw & Blakeley.
Batley,	"	James Critchley.
Beggarington (Hartshead),	"	E. Crowther & Co.
Bunkers Hill (Whitley),	"	Luke Kitson.
Calder (Mirfield),	"	Charles Wheatley.
Chickenley Heath,	"	Crawshaw, Blakeley & Co.
Cowmes (Thornhill),	"	Capt. Joshua C. Ingham.
Cross Bank (Batley),	"	John Holliday & Brothers
Crossley Lane,	"	Benjamin Barraclough.
Dewsbury Bank,	"	Crawshaw & Blakeley.
Dewsbury Moor,	"	Wroe & Co.
Dewsbury Moor,	"	Messrs. Haigh.
Dogloach,	"	Crawshaw & Blakeley.
Falhouse (Whitley),	"	Joseph Bedford.
Gregory Spring (Mirfield),	"	J. Sheard.
Hartshead,	"	Hird, Dawson, & Hardy.

YORKSHIRE COLLIERIES.—*Continued.*

Name of Colliery.	Where situated.	Owner's Name.
Heeley (Briestfield),	Dewsbury,	Hamath Fell.
Hagg Wood,	"	Charles Wheatley.
Hopton,	"	Joseph Sheard.
Hostingley (Thornhill),	"	Capt. Joshua C. Ingham.
Ings (Thornhill),	"	Do.
Lane Dyehouse,	"	J. Wheatley.
Ledgard Bridge (Mirfield),	"	Charles Wheatley.
Liversedge,	"	David Wroe & Co.
Mirfield Moor,	"	Messrs. Marriott.
Northorpe (Mirfield),	"	Benjamin Barraclough.
Park Farm,	"	Park Coal Co.
Ravens Lodge,	"	Messrs. Haigh.
Soothill,	"	Crawshaw & Co.
Syke Ing,	"	Syke Ing Mill Co.
Warren House,	"	Messrs. Walker.
Whitley Wood,	"	Charles Wheatley.
Upper Batley,	"	Hardy & Co.
Upper Crosley,	"	Benjamin Barraclough.
Alderscholes (Thornton),	Halifax,	Michael Pearson.
Banks,	"	Messrs. Pitchforth.
Bank Bottom,	"	W. H. Rawson.
Binns Bottom,	"	Hebblethwaite & Co.
Brackens Lane End (Shelf),	"	Topham & Co.
Bradshaw (Ovenden),	"	Lassey & Co.
Bradshaw Lane,	"	Spencer & Co.
Clayton,	"	Briggs & Sons.
Crooked Lane,	"	Michael Stocks.
Dickey Steel (Elland),	"	Henry Hawkyard.
Dove House,	"	Holt & Co.
Elland,	"	Robinson & Co.
Harp Bottom, (Queensbury),	"	Joseph Metcalf & Co.
Highfield,	"	Holmes & Holt.
Lightcliffe,	"	Barraclough & Sons.
Lime House,	"	Holt & Co.
Mountain End,	"	Foster & Son.
Park Bottom,	"	George Wilson.
Peep Green,	"	Sheard & Co.
Quarry House,	"	Holmes & Co.
Queensbury,	"	Joseph Briggs & Sons.
Rooks (Hipperholme),	"	Tordoff & Sons.
Shaw Lane,	"	Michael Stocks.
Shibden,	"	Holmes & Co.
Shibdendale,	"	R. Woodhead.
Shibden Hall,	"	John Lister.
Shugden,	"	Michael Stocks.
Shugden Head,	"	T. S. Walsh.
Do.	"	Spencer & Co.
Soil Hill (Ovenden),	"	Lassey & Co.
Stonyhall,	"	M. Sheard.
Swan Bank,	"	Swan Bank Coal Brick works Co.
Thornton,	"	Briggs & Sons.
Box Ings,	Huddersfield,	Seth Senior & Sons.
Bradley,	"	Charles Wheatley.
Brockholes,	"	Messrs. Haigh.
California (Shelley),	"	Matthews & Co.
Clayton Common (Clayton West),	"	Norton Brothers & Co.
Close Hill,	"	James Wheatley.
Common Side (Cumberworth),	"	James Peace.
Cowmes,	"	J. Sheard.
Cumberworth,	"	Abel & John Addy.
Duke Wood (Clayton West),	"	Norton Brothers & Co.

YORKSHIRE COLLIERIES.—*Continued.*

Name of Colliery.	Where situated.	Owner's Name.
Ellen Tree,	Huddersfield,	John Alderson & Son.
Fartown,	"	James Wheatley.
Fieldhouse,	"	Edward Brooke.
Grangehouse,	"	C. Sutcliffe.
Grimescar,	"	Jones & Waterhouse.
Helm,	"	Charles Wheatley.
Hollinghouse,	"	Messrs. Haigh.
Hollinghouse,	"	James Robinson.
Kirkburton,	"	W. Rhodes.
Kirkheaton,	"	Messrs. Cardwell.
Kirk Style (Cumberworth),	"	Henry Ellis & Co.
Lane,	"	James Whitley.
Lane Side (Shelley),	"	Messrs. Kenyon.
Linfit,	"	Hey & Carter.
Lockwood Common,	"	James Whitley.
New Ground,	"	Do.
Pease Close,	"	J. Sheard.
Redhill (Shelley),	"	Matthews & Co.
Rowley,	"	J. Sheard.
Shelley,	"	Copley & Co.
Sinking Wood,	"	Messrs. Haigh.
Taylor Hill,	"	James Whitley.
Toppit (Clayton West),	"	John Hargrave & Co.
Upper Bradley,	"	John Cookson.
Whitley (Kirkheaton),	"	Messrs. Cardwell.
Wood,	"	Messrs. Haigh.
Barnside (Hepworth),	Holmfirth,	William Shaw.
Brickworks,	"	Uriah Tinker.
Carr Wood (New Mills),	"	Charles Lockwood.
Forster Place (Hepworth),	"	Ebenezer Haley.
Foxhouse,	"	Mrs. Wagstaff.
Fulstone (New Mills),	"	Charles Lockwood.
Gatehead,	"	Uriah Tinker.
Hepshaw,	"	Do.
Hollin House (New Mills),	"	Hepworth Iron Co.
Hepworth,	"	"
Meltham,	"	Uriah Tinker.
Thurstonland,	"	James Whitley.
Wood,	"	Uriah Tinker.
Ingletton,	Settle,	Hunter & Co.
Adwalton Moor,	Leeds,	William Bower & Brothers.
Allerton Main,	"	Joshua Bower.
Do. Haigh Moor,	"	Locke & Co.
Astley,	"	Joshua Bower.
Baildon Moor,	"	William Midgley.
Balaklava (Morley),	"	West Yorkshire Iron & Coal Co.
Beeston,	"	The Farnley Iron Co.
Do.	"	Harding & Co.
Do.	"	Hird, Dawson, & Hardy.
Beeston Lodge,	"	J. Clarke.
Beverley (Armley),	"	W. H. Chapman.
Birkhill (Birkenshaw),	"	Messrs. Harrison.
Blakeley,	"	J. Scott & Son.
Blue Hills Lane (Wortley),	"	Benjamin North.
Britannia Main (Adwalton),	"	Barraclough & Co.
Brook House (Gomersal),	"	Thomas & John Tattersall.
Brown Moor,	"	Manston Coal Co.
Burmantofts,	"	Heptenstall & Co.
Bushey (Drighlington),	"	Newmarket Coal Co.
Calverley,	"	Woodhead's Executors.
Churwell,	"	Knowles & Co.

YORKSHIRE COLLIERIES.—*Continued.*

Name of Colliery.	Where situated.	Owner's Name.
Churwell,	Leeds,	Harding & Co.
Do.	"	Hird, Dawson, & Hardy.
Do.	"	William Ward.
Do.	"	The Farnley Iron Co.
College (Birstal),	"	Rhodes' Executors.
Cross Green,	"	Bowling Iron Co.
Crow Trees (Gomersal),	"	Rhodes' Executors.
Dartmouth,	"	William Ward.
Dean House (Morley),	"	Bedford & Co.
Doles Wood (Drighlington),	"	Drighlington Coal Co.
Dye House (Gomersal),	"	Knowles & Co.
Elland Road,	"	Messrs. Towler.
Ellerby Lane,	"	Bowling Iron Co.
Farnley,	"	The Farnley Iron Co.
Farnley Wood,	"	A. Rogers & Son.
Farsley,	"	William Sharp.
Foxholes (Methley),	"	William Wood.
Garforth,	"	Gascoigne & Co.
Gelderd Road,	"	William Ward.
Gildersome,	"	The Farnley Iron Co.
Do.	"	Do.
Do. Street,	"	John Holliday & Brothers.
Green Man (Hunslet),	"	Robinson & Co.
Greville (Rawden),	"	Smith & Co.
Harehills,	"	The Farnley Iron Co.
Holbeck,	"	Hird, Dawson, & Hardy.
Howden Clough,	"	Asquith, Brothers, & Co.
Howley Park (Morley),	"	Howley Park Coal Co.
Hunslet,	"	Hird, Dawson, & Hardy.
Lanes Wood (Gomersal),	"	Samuel Jackson.
Killingbeck (York Road),	"	Messrs. Garside.
Little Gomersal,	"	Crowther & Co.
Lumb Wood,	"	Drighlington Coal Co.
Manston,	"	Edward Waud.
Manston Lodge,	"	J. B. Ackroyd.
Micklefield,	"	Manston Coal Co.
Middleton,	"	Tetley & Co.
Morley,	"	Harding & Co.
Do.	"	The Farnley Iron Co.
Morley Main,	"	William Ackroyd & Brothers.
Nethertown,	"	W. Gledhill.
Neville Hill,	"	Norwegian Titanic Iron Co.
Newmarket (Adwalton),	"	Newmarket Coal Co.
New Hall (Middleton),	"	Grosvenor & Son.
Oakwell,	"	William Ackroyd & Co.
Osmondthorpe,	"	The Farnley Iron Co.
Owlet Hall,	"	Mason & Co.
Potternewton,	"	Farnley Iron Co.
Primrose Hill (Liversedge),	"	Thomas Hardy Jackson.
Quaker Lane (Liversedge),	"	John Sheard.
Robert Town,	"	Mann & Co.
Do.	"	Parkin & Co.
Robin Hood,	"	Messrs. Charlesworth.
Rock (York Road),	"	Incrook & Co.
Rothwell Haigh,	"	Messrs. Charlesworth.
Scotland (Gomersal),	"	Messrs. Harrison.
Scratch Lane (Gomersal),	"	Messrs. Jackson.
Seacroft,	"	Manston Coal Co.
Smithies (Birstal),	"	Baslow & Crossley.
Smithy Hill (Liversedge),	"	Thomas Parkins.
Spring Gardens,	"	Drighlington Coal Co.

YORKSHIRE COLLIERIES.—*Continued.*

Name of Colliery.	Where situated.	Owner's Name.
Stanley Main (Liversedge), . . .	Leeds.	Stanley Coal Co.
Strawberry Bank (Liversedge), .	"	Liversedge Coal Co.
Sykes (Drighlington),	"	Roole & Dolby.
Tanhouse Mill (Liversedge), . . .	"	Tanhouse Mill Co.
Toft Shaw Moor,	"	Healey & Pettey,
Tong Moor,	"	Do.
Waterloo,	"	Clay & Co.
Waterloo Main,	"	John T. Leather.
Water Loose (Adwalton),	"	Ellison & Co.
Wellington,	"	John Jackson & Son.
West Yorkshire (Birstal),	"	George Ellison.
Do. (Manston),	"	Manston Coal Co.
White Horse (York Road),	"	Messrs. R. & W. Garside.
White Lee,	"	Baslow & Crossley.
Wortley,	"	Ingham & Son.
Do.	"	Joseph Cliffe & Son.
Victoria (Morley),	"	Messrs. Haigh.
Do. (Adwalton),	"	George Ellison.
Do.	"	John Holmes.
York Road,	"	Robinson & Clayton.
Haigh Moor,	Normanton,	Pope & Co.
Methley Junction,	"	Briggs & Co.
West Riding,	"	Pope & Co.
Whitwood,	"	Henry Briggs, Son, & Co.
Berry Moor,	Penistone,	Messrs. Hinchliffe.
Bullhouse,	"	Do.
Crow Edge,	"	Do.
Denby Dale,	"	Thomas Haigh.
Middlecliffe,	"	Thomas J. Tinker.
Allerton Bywater,	Pontefract,	Thomas Carter & Co.
Featherstone,	"	Featherstone Coal Co.
Glass Houghton,	"	Wilks & Co.
Newton Main,	"	H. K. Spark.
Snydale,	"	Rhodes & Co.
Wheldale,	"	Holt & Co.
Aldwark Main,	Rotherham,	Shaw & Co.
Aston,	"	George Law.
Carhouse,	"	Rhodes & Co.
Denaby Main,	"	Denaby Coal Co.
Elsecar,	"	Earl Fitzwilliam.
Fence (Woodhouse Mill),	"	Fence Coal Co.
Grange,	"	Chambers & Son.
Grange (Ironstone),	"	Do.
Greasbrough Old Park Gate,	"	Sellars & Co.
Greenfield (Rawmarsh),	"	
Holmes,	"	Masborough Coal Co.
Kilnhurst,	"	Messrs. Charlesworth.
Kimberworth,	"	Beale & Co.
Manvers Main,	"	Manvers Main Co.
Park Gate,	"	Earl Fitzwilliam.
Rawmarsh,	"	J. Knapton.
Do. Albany and Royal Oak,	"	Messrs. Charlesworth.
Scholes,	"	Beale & Co.
Thorpe Common,	"	Potter & Co.
Tinsley Park,	"	Benjamin Huntsman.
Warren Vale,	"	Messrs. Charlesworth.
Waleswood,	"	Skinner & Holford.
West Melton,	"	Laws.
Ashes,	Saddleworth,	Leeses & Co.
Strinesdale,	"	Chadwick & Co.
Base Green (Gleadless),	Sheffield,	Joseph Rhodes.

YORKSHIRE COLLIERIES.—*Continued.*

Name of Colliery.	Where situated.	Owner's Name.
Beighton,	Sheffield,	Skinner & Holford.
Birley,	"	Jeffcock & Dunn.
Bracken Moor (Deepcar),	"	John Helliwell.
Brightside,	"	Unwin & Co.
Carbrook,	"	Pitsmore Coal Co.
Castle,	"	Jeffcock & Dunn.
Deepcar,	"	John Armitage.
Do,	"	Joseph Grayson.
Do,	"	Benjamin Coldwell.
Dungworth,	"	Haigh & Co.
Eastfield (Thurgoland),	"	Jonathan Jowett,
Elder Cliff (Deepcar),	"	Thomas Grayson.
Handsworth,	"	Benjamin Huntsman.
Haywood (Deepcar),	"	John Armitage.
Henholmes (Do.)	"	Do.
Hunshelf,	"	Joseph Jubb.
Do,	"	Thomas Peace.
Kiveton Park,	"	Harrington & Co.
Lee Wood (Thurgoland),	"	Wilcock & Co.
Manor,	"	Benjamin Huntsman.
New Winning,	"	Do.
Orgreave,	"	Mrs. Sorby.
Sheffield,	"	Benjamin Huntsman.
Sim Hill (Thurgoland),	"	Messrs. Wilcock
Stocksbridge (Deepcar),	"	Samuel Fox & Co.
St. David's (Oughtibridge), . . .	"	Russell & Co.
Tankersley,	"	Newton, Chambers, & Co.
Thorncliffe,	"	Do.
Thurgoland,	"	George Darwent.
Wharnciffe (Oughtibridge), . . .	"	J. Beaumont.
Wharnciffe Wood,	"	Silver Fire Brick Co.
Woodhouse (Handsworth),	"	Herring & Co.
Woodthorp,	"	John Rhodes.
Wortley Silkstone,	"	Andrews, Burrows, & Co.
Ardsley Fall,	Wakefield,	Mrs. Ann Hudson.
Alverthorpe,	"	Messrs. Haigh.
Bottom Boat,	"	Messrs. Charlesworth.
Bretton,	"	Messrs. Jagger.
Dewsbury Lane (Ossett),	"	W. Gartside.
Dirtcar,	"	Moore & Co.
East Ardsley,	"	J. Roberts & Co.
Do,	"	East Ardsley Co-operative Coal Co.
Emley Moor,	"	Messrs. Jagger.
Emley Park,	"	Edward Stringer.
Emroyd,	"	Stansfeld & Co.
Field Lane,	"	George & John Haigh.
Flockton,	"	Sir J. L. L. Kaye, Bart.
Do,	"	Stansfeld & Co.
Do,	"	Lockwood & Co.
Flockton (Overton),	"	Beacher & Co.
Flockton Moor,	"	Messrs. Jagger.
Gawthorp (Ossett),	"	Wilson & Co.
Do,	"	George & John Haigh.
Grange,	"	Sir J. L. L. Kaye, Bart.
Grange Moor,	"	Stansfeld & Co.
Do,	"	Lockwood & Stockwell.
Do,	"	Wood & Stockwell.
Hollingthorp,	"	Cliff Coal & Fire Clay Co.
Hunt Royal (Upper Whitley), . . .	"	John Roberts.
Low Laiths,	"	J. Roberts & Co.
Lupset,	"	Thomas Yates & Co.

YORKSHIRE COLLIERIES.—*Continued.*

Name of Colliery.	Where situated.	Owner's Name.
Manor,	Wakefield,	Woodhead & Co.
Milnthorp,	"	Messrs. Charlesworth.
Needle Eye (Denby Grange),	"	Wormald & Eastwood.
Newmarket,	"	Messrs. Charlesworth.
Nostell,	"	Charles Winn.
Ossett,	"	Messrs. Haigh.
Park Lane (Ossett),	"	Cliffe & Co.
Providence,	"	Joseph Marsland.
Ravensthorpe,	"	Messrs. Haigh.
Roundwood,	"	Terry, Greaves, & Co.
Saint John's,	"	Burnley's Executors.
Sharlston,	"	Pope & Co.
Snapethorp,	"	William Hargreaves & Co.
Stanley,	"	Hudson & Co.
Star (Netherton),	"	Joseph Rhodes.
Stocksmoor,	"	Sir J. L. L. Kaye, Bart.
Victoria,	"	Hudson & Co.
West Ardsley,	"	J. Roberts & Co.
West Field (Ossett),	"	Joshua Wilby.
Winney Moor,	"	Hargreaves, Hargreaves, & Naylor.
Woodmoor,	"	Messrs. Charlesworth.
Wrenthorpe,	"	Daniel Micklethwaite & Co.

CHAPTER II.

GENERAL DESCRIPTION OF THE COUNTY OF YORK.

Natural Resources and Products of the East Riding of Yorkshire.—We pass from the great mineral and manufacturing region of the West Riding to the rich soils, the skilful agriculture, the fine ports, and the extensive commerce of the East Riding. We shall first describe the resources dependent on soil and climate, and afterwards, in another chapter, speak of the harbours, rivers, and commerce of this and other portions of the county of York.

The systems of agriculture adopted in different parts of England are greatly varied by the numerous variations in the nature of the soil, the elevation of the land, the amount of rainfall, and the average temperature of the atmosphere, both in the winter and the summer months. These may be considered as the principal natural causes which affect the cultivation of Yorkshire, in common with that of other parts of England, and cultivation in general. There are also a number of economic causes, which have a great effect in fixing the mode of cultivation in this extensive county. The most important of these are—the amount of capital and of skill applied to the cultivation of the soil; the nearness or the distance of good markets, for the sale of every variety of produce; and the cheapness or dearness of the supplies of mineral and vegetable manures, which are required to maintain the undiminished fertility of the soil. All these causes enter intimately into the consideration of the modes of cultivation which are best suited for different districts; and in the densely-peopled parts of this county, in which there is an unlimited demand for all the productions of the soil, and where the large towns supply abundant means of restoring and maintaining the fertility of the surrounding districts, the systems of cultivation are chiefly decided by those two causes. This is especially the case in the more populous districts of the West Riding, in which the resident population is not only able to purchase and consume all the crops of every kind that can be grown on the land, but where it also requires and

receives large supplies of all those kinds of agricultural produce, which from their nature and value admit of being brought from the more distant parts, not only of Yorkshire, but of other English counties, and even from foreign countries. In the more fertile parts of the North Riding, and in the East Riding, which is almost everywhere fertile, in both of which districts the population is comparatively small, the cultivation possesses less of a local character, and belongs to what may be considered as the general system of agriculture adopted throughout England. There the natural causes dependent on soil, climate, temperature, and the elevation of the land, have a preponderating influence in determining the modes of cultivation.

The Agriculture of the East Riding.—The agriculture of the East Riding of Yorkshire differs greatly from that of the West, and is in general very much superior to it. It much resembles the cultivation of the finest districts of Lincolnshire and Norfolk—a circumstance attributable to the fact that the East Riding resembles those two great agricultural counties in the nature of its soils, in its freedom from excessive rains, and in the heat of its summer months. The only soils which the East Riding of York has in common with the West Riding are those resting on the new red sandstone, on the eastern side of the vale of York, and the alluvial soils along the banks of the Ouse and the Humber. But these two soils form a small portion of the farming lands of the East Riding. Those consist chiefly of the Chalk, the Lias, and the Oolite, the first of which is the main stratum of the Riding, and of the alluvial soils of Holderness, which differ greatly from the diluvial deposits on the banks of the Ouse and the Humber. Commencing at the point at which our account of the West Riding and its agriculture closed, we proceed eastward, taking first, the vale of York; second, the chalk or wold district; and third, the alluvial land of Holderness. These may be considered as the great divisions of the East Riding; but in addition to these there are other formations which run in narrow winding lines along the northern and western edge of the chalk formation, commencing on the sea-coast at Filey Bay, and winding round the northern and western sides of the wolds until they reach the river Humber, under which they pass into Lincolnshire. These narrow bands consist of the upper greensand along the edge of the chalk, the Portland limestone and Kimmeridge clay, the Oxford clay, the

coral rag, and the Lias clay. Most of these formations are still more extensively developed in the North Riding of Yorkshire, whence they run southward through the East Riding, in narrow bands; and after passing under the Humber, again expand both east and west, and form the larger part of the eastern and southern districts of England. This is the great corn-field of England, which commences on that part of the coast of Yorkshire where the Chalk, the Oolite, and the Lias rise above the sea, and continues southward, eastward, and westward, until those strata sink again under the waters of the British Channel.

The whole of the East Riding of Yorkshire is a fine agricultural district, and much the greater portion of it is suited to the four-course system of agriculture, which may be regarded as the most perfect system of cultivation existing in Great Britain, if not in the world. It is only within the last sixty or seventy years that this system, which gives a green crop and a white crop every alternate year, has become generally established in the East Riding. Until drill and turnip husbandry were discovered or brought to perfection by Tull, Dawson, and other skilful agriculturists, the greater portion of the land of the East Riding was of very little value, some portions of it being too stiff, whilst others were too light, for profitable cultivation. The latter defect existed throughout the whole of the chalk formation, which forms the central and the larger portion of the East Riding. The natural herbage of this district is a short, sweet grass, suited to the feeding of the lighter breeds of sheep and young cattle; but the land was quite unfit for the plough, and more especially unfit for the production of wheat and other exhausting crops. The effect of introducing turnip husbandry, of the growth of clover and artificial grasses, and of consuming the whole of the green crops on the land on which they are grown, has been to render the light chalk downs or wolds of the East Riding capable of bearing corn crops every second year, in a continual rotation of grasses, wheat, turnips, and barley. It is very doubtful whether there is any other system of cultivation under which even the best lands in England could be made to produce a corn crop every second year, without a serious decrease in the productiveness of the soil; but under the four-years' rotation, as it is practised in the East Riding, and in other districts of England equally well cultivated, large crops of wheat and barley are secured every second year, without any

diminution in the fertility of the land, even on the lightest soils. Large as is the present produce of the soil, in the best cultivated districts of England, it is not too much to say that the introduction of a system equally good, in every part of the country, would go far towards doubling the present produce of the soil of this kingdom.

Whilst the light chalk lands in the central districts of the East Riding are especially suited for turnip husbandry and the breeding of sheep, the stronger lands of the new red sandstone, the Oolitic, the Lias, and the alluvial formations, may also be regarded as amongst the best formations in the kingdom for agricultural purposes. In general they are sufficiently dry, wherever attention has been paid to thorough drainage, to produce large crops of grain, roots, and grasses. Almost the only exceptions are in what are called the car or marsh lands, in the lower part of some of the valleys of the East Riding, which are liable to be flooded by the rapid flow of water from the high lands after heavy rains. This is the case to a considerable extent along the course of the river Hull, the feeders of which stream flow down from the eastern side of the chalk hills of the East Riding; and also on the lower part of the banks of the river Derwent, which brings down a large portion of the waters of the East Riding, and even a larger portion of those of the North Riding.

On the subject of the drainage of this and other parts of Yorkshire, Mr. William Wright observes, in his Prize Report on the Agriculture of this county (1861)—that Yorkshire may be said to be about two-thirds drained with two-inch pipes, and parallel drains of a depth of four feet; but in some places, such as the vale of Derwent, and the lands on the banks of the river Hull, between Beverley and Driffield, the main drains and outfalls not being sufficiently lowered, the drainage is necessarily less complete. Indeed, from the insufficiency of the outlet, the backwater often causes great destruction to the standing crops, particularly in wet summers, like that of 1860. The want of a sufficient outfall renders four feet drainage impossible in these districts, and an injurious effect is produced on the climate. Were all the impediments removed and the natural drainage of the country allowed to flow freely, the agricultural produce would be augmented, the stock of sheep and cattle improved and increased, and the healthiness of the lowlands considerably promoted. As a further proof of the insufficiency

of the drainage of this part of the county, he extracts a paragraph from a local paper published after the November rains:—"The recent heavy rains have caused the Derwent and its tributaries to overflow their banks, and on Friday and Saturday the vast tract of country watered by that river and the smaller streams was laid under water. In many places the water rose to a height of four feet or more, the hedges having for miles quite disappeared. The consequence of the inundation will prove most destructive to the lowland farmers. The unusually rainy season had done much injury in retarding the sowing of the wheat crop, which will now be rendered quite impossible; many thousands of acres will thus be thrown under spring crops. The aftermath in the grasslands will be spoilt by the deposit of sand and mud, and the cattle will be totally dependent upon the scanty root crops. Several stacks are floating down the stream; one farmer alone having been said to have lost twenty acres of oats. In the marshes several beasts are reported to have been found drowned." Means have since been taken to remedy the evil. At an influential meeting of landowners held at Howden, the following resolution was unanimously passed, "That the renewal of the commission of sewers for the limits of Howdenshire, and the west parts of the East Riding (the last commission having expired 12th July, 1843), would be of considerable benefit and advantage to the owners of lands situate within such limits, and their tenants."

In giving an account of the agriculture of the East Riding of Yorkshire, we shall chiefly follow the Prize Report on the Farming of the East Riding of Yorkshire, by Mr. George Legard, published in vol. ix. of the "Journal of the Royal Agricultural Society of England," continuing it nearly to the present times, from Mr. William Wright's "Prize Essay on the Improvements in the Farming of Yorkshire" since the date of Mr. Legard's Report. Mr. Legard states that the topographical features, as well as the geological construction of the East Riding, seem to require that it should be separated into three districts:—namely, 1st, the Wold district, occupying the central high lands of the Riding; 2nd, Holderness, stretching out in a south-easterly direction, from the Wold Hills to Spurn Point; and 3rd, the Vale of York, extending from the west escarpment of the wolds to the rivers Derwent and Ouse. We shall make the same division, but shall follow the order of the strata, beginning with the new red sandstone, the Lias, and the lower portions of the Oolite; then

taking the chalk formation and the greensand, in the centre of the county; and concluding with the alluvial district of Holderness, which extends far into the sea, and along the northern bank of the river Humber.

The Vale of York and its Strata.—Commencing on the banks of the Ouse and the Derwent in the vale of York, the greater part of which rests on the new red sandstone, that rock lies so low and is so thickly covered with diluvial matter, along the course of those rivers, as to have very little influence on the cultivation of the district. The north-eastern portion of the vale of York is crossed by beds of the Oolitic system, and here consequently great diversities of soil and cultivation exist. The Lias clay extends in a band averaging about two miles in breadth from the river Derwent to the Humber, and furnishes extremely tenacious soils, more suited for pasture than for tillage.

The remainder of the vale of York district, which constitutes three-fourths of the whole, extending south and south-westward from Garrowby Street, may be considered as practically level. It is crossed, as has been stated, in two or three places by beds of drift, gravel, and clay; these, however, are too unimportant in extent to merit any detailed description.

The soils throughout this level tract, being for the most part diluvial, are various in depth and quality. Descending from the wold hills near Pocklington, and passing over the narrow beds of Lias clay which here form their base, we find a tract of chalky gravel extending from this town nearly to Market Weighton. Cultivation and the progress of agricultural knowledge have conduced to convert this, which was probably formerly a very hungry soil, into profitable arable land. Beyond these gravels, which do not extend far from the parent hills, whence they have evidently derived their origin, we next arrive at a very barren tract of land, which forms rather a remarkable variety in the vale of York. This belt, for so it may be termed, runs nearly parallel to the Lias clay. It is about two miles broad, and extends almost continuously from within a mile or two of the Humber to the north-western confines of the Ridings, near Stamford Bridge. The surface soil is throughout a poor, blowing, ferruginous drift sand, chiefly covered with ling and furze, and distinguishable here and there by a few stunted Scotch fir plantations. Attempts at cultivation have been made from time to time in various parts of this unpromising tract; but all such attempts were aban-

doned almost as soon as made, until of late years. Recently, however, it has been discovered that beneath this barren surface there lie beds of clay and marl; and that wherever these beds approach near to the surface, great benefit may be derived from the practice of digging out the clay and spreading it largely over the land. In some cases from 100 to 150 cubic yards per acre have been thus spread; and in no case has it been found advisable to apply less than eighty yards per acre. In this way, upon an estate belonging to Mr. Denison, near Pocklington, between 200 and 300 acres have been reclaimed, and converted from a mere rabbit warren into very good farming land, which may now be worth nearly twenty shillings per acre. Indeed, it is probable that the whole of the tract now described, containing not less than 15,000 acres, more than half of which is entirely uncultivated, and the rest extremely infertile (with the exceptions above named), is equally capable of reclamation.

Upon the sandy and gravelly beds which occur in that part of the vale of York, which rests immediately on the new red sandstone, the four-course system of husbandry, namely, turnips, barley, seeds, and wheat, is generally practised. The sandy zone of land previously described produces good crops, both of turnips and potatoes, after being properly drained. Mr. Denison showed, in a paper which he published in the Transactions of the Yorkshire Agricultural Society, how great were the benefits which his estate had derived from draining, marling, and subsoiling. He calculated that the expense of subsoiling was not more than 28s. per acre, and stated that by those means land which two years previously had been let for not more than 2s. 6d. per acre, was made to produce ten quarters of oats per acre.

The Howdenshire Warpsoils.—Upon the Howdenshire warpsoils, as at Saltmarsh, Sandhall, &c., there is some extremely good farming. For many years the potato has been largely and profitably cultivated on these deep rich lands. The mode of cropping is this: 1st year, potatoes; 2nd, wheat; 3rd, clover or beans; 4th, oats or barley. The preparation of the land for potatoes here is equivalent to a turnip fallow elsewhere, and a similar process is followed. The land is set out in ridges thirty inches apart, and heavily manured. The time for taking up the crop immediately succeeds that for the housing of the corn, and to the people of this district has all the importance of a second harvest. In a good

potato year the produce per acre amounts to 400 bushels. When Mr. Strickland wrote his Report on the Agriculture of Yorkshire, in the year 1812, during the great French war, he remarked that in Howdenshire, and on the eastern bank of the Derwent, flax was grown in considerable quantities, and that is the case still, not only in this district, but on the warplands of the West Riding. The general course of cultivation is, on the stronger lands, fallow, wheat, and beans, which is sometimes extended into a four-years' rotation by sowing a mixture of clover and rye grass in the wheat crop in spring. The farms of this district are not large, few of them exceeding 200 acres, and the average being about 150 acres. The land is generally level. From the foot of the wolds the rivers Derwent and Fouldney, and other small streams, run with a south-westerly course into the river Ouse. The fall of the waters is very slow, and after heavy rains the lower levels are very much inundated.

The Cultivation of Flax.—Flax is more extensively cultivated in the East and West Ridings of Yorkshire than in any other part of England. On this subject Mr. William Wright, in his Report of 1861, observes that—"The cultivation of flax in this county has been steadily increasing during the last twelve years, the variety of fibrile textures into which it is introduced and its high price giving an impulse to growers. Yorkshire has long been known for the fine quality of this plant, which under the new system of management is considerably improved. The quantity sown is much influenced by circumstances, such as the price it realizes, and the value of other kinds of agricultural produce, and fluctuates with each particular season. On the banks of the Ouse and Trent, where the cultivation is considerable, the importance of this crop increased with the occasional failure of the potato. Improved machinery for scutching flax by steam instead of hand-power, has contributed to make this a more profitable crop than formerly. Considerable prejudice still exists among some landowners against it, as an exhausting crop; but the discoveries of science have done much to dispel the feeling, although some persons devoid of experience still cling to the notion that it is baneful to the land. The repeated growth of flax on the same land is unprofitable, because quality is then sacrificed; but, taken in due course, this does not interfere with the production of other crops satisfactory both in quantity and quality. It seldom, if ever, occupies the ground more

than four months, and therefore allows sufficient time in average seasons for a good fallow previous to the wheat crop, which experience proves to be its best successor."

The Lias and Oolite Soils.—The Lias clay extends in a band, averaging about two miles in breadth, from the river Derwent, near Howsham, to the Humber, at Brough. It furnishes extremely tenacious soils, which would perhaps be more profitably devoted to pasture than to tillage. The Inferior Oolite may be seen immediately underlying the chalk at the village of Acklam, where it occupies rather high ground. Thence it descends, but still forms a ridge of some elevation, and may be traced by Gally Gap to Howsham, Weston, and Firby. Passing along the range of the Wold hills in a southerly direction, no trace of the oolites can be found from Acklam until they reappear near the village of Sancton; they then trend away in narrow beds lying parallel to the chalk, until they are lost and overlaid by the alluvia of the Humber banks. Wherever the beds of the Lower Oolite are near the surface a fine friable soil is found, well adapted for the growth of turnips and barley. The Upper Oolite beds are also well defined.

Beginning at the north-western edge of the wolds, they are first met with about halfway betwixt North Grimston and Wharram-le-Street. From this point these tabular hills range, by Langton Wold, to Welham and Malton. Like the inferior members of the series, the disintegration of this rock produces good turnip and barley soils. The same distinguishing characteristic of these soils, however, which was pointed out by the late Sir John Johnstone, in a paper in the first volume of the Journal of the Royal Agricultural Society of England, is noticeable here also; viz., that the soil formed by them is equally well fitted for pasturage and for arable culture. At North Grimston this may be seen in some very superior grazing land lying west of the village. Langton Wold also, though partly covered by aboriginal heather, is in other parts distinguished by the fineness of its herbage; and if we step beyond the limits of the Riding, and observe the grass-land in the neighbourhood of Castle Howard Park, we shall find ample testimony to the truth of this observation.

The Wold and Chalk Formations.—One of the most interesting parts of the agriculture of the East Riding, as we have already stated, is that presented by the reclamation and culture of the chalk hills and wolds, which first make their appearance on the

English coast at Flamborough Head, as lofty precipices, and then run into the interior in the form of extensive downs, stretching in a south-easterly direction as far as Bishop-Wilton Beacon; whence they run nearly due south almost to the banks of the Humber. The chalk formation is the central part of the East Riding, and its reclamation and present very superior cultivation may be regarded as amongst the greatest triumphs of British agriculture. Till near the commencement of the present century the wolds were almost entirely uncultivated, and presented the aspect of wild upland moors. Sheep and turnip husbandry have converted these lofty moors into one of the most fertile districts that is to be met with in England. The following particulars with regard to the wolds of the East Riding, and their cultivation, are chiefly from the Prize Report of Mr. George Legard on the Agriculture of the East Riding.

"The area occupied by the chalk hills," says Mr. Legard, "may be illustrated by comparing it to the letter L inverted, in Roman character, placed rather obliquely; the upper limb representing the northern division or high wolds, which extend from Acklam Brow to Flamborough Head, a distance of thirty miles; the stem indicating a tract of land which may be termed the lower wolds, and which extends from near Huggate to Hessle on the Humber, in a south-easterly direction, being about twenty-nine miles long by five or six broad. The outer sides of the diagram correspond in some degree with the abrupt escarpments of these hills on their north and west sides—the one towards the vale of Pickering, the other towards the vale of York; whilst, in the angle formed by the limb and stem may be imagined the surface of the chalk gradually sloping towards the south-east, until it dips altogether beneath the diluvial soils of Holderness. These hills attain their highest elevation at Bishop-Wilton Beacon, where they are 812 feet above the level of the sea. From this point southward they gradually decrease in height, until, at Brantingham, the southernmost brow of the wolds in Yorkshire, they do not exceed 500 feet. Throughout the whole of the high wold district the elevation of the summits of the hills is pretty uniformly maintained. The dip of the strata is to the east, and is stated by Professor Phillips to be about sixteen feet per mile. This high district may be generally described as consisting of two or three long parallel ridges, running east and west, having on their summits a consider-

able breadth of flat table-land. Upon these elevated plains there is uniformly found a covering of diluvial matter from eighteen inches to two feet in thickness; which consists of a deep and dark-coloured loamy soil, occasionally having an admixture of clay. The soil of the lower wolds answers tolerably well to the description given by Henry Strickland, Esq., who published "A Survey of the East Riding of Yorkshire, by order of the Board of Agriculture," in the year 1812. He says (p. 14):—"The soil of the wolds is, with little variation, a light, friable, calcareous loam from three to ten inches in depth." Marshall, who, in the year 1788, published a work entitled 'The Rural Economy of Yorkshire' says, (vol. ii. p. 244), 'The material which forms the natural construction of the Yorkshire wolds is probably a uniform rock of hard chalk, rising in most places to near the surface. . . . The prevailing soil is a calcareous loam, varying in depth and productiveness.'

Recent researches have shown that the soils resting upon the chalk do not partake so much of the nature of the rock beneath as was formerly thought. An analysis made by Mr. Spence of York, and published in the Transactions of the Yorkshire Agricultural Society, in the year 1841, proves that five per cent. of calcareous matter is the utmost that these soils contain, and some of them little more than two per cent.*

"The reason of the variety of the soil of the wolds (says the Rev. Mr. Thorpe, in the Transactions), is easily explained by a consideration of the diluvial beds of Holderness, which lie upon the chalk. Enormous masses of water have brought these beds of clay and boulders, not only over the Penine chain of England at Stainmoor, but over the Hambleton hills and western escarp-

* WOLD SOILS ANALYZED BY SPENCE.

	Deep Wold, Replingham.	Shallow Wold, Bishop-Wilton.
Water of absorption,	4	9
Matter soluble in water,	1	$\frac{7}{10}$
Matter destructible by heat (vegetable),	5	10
Siliceous sand,	74	62
Alumina,	$3\frac{3}{10}$	4
Oxide of iron,	$6\frac{5}{10}$	$6\frac{4}{10}$
Carbonate of lime,	$2\frac{2}{10}$	5
Phosphate of lime,	$\frac{4}{10}$	$\frac{1}{10}$
Carbonate of magnesia,	1	$1\frac{5}{10}$
Potash,	$\frac{1}{10}$	$\frac{1}{10}$
Loss,	$1\frac{4}{10}$	1
Total,	100	100

ment of the wolds, furrowing the latter into deep east and west valleys—the degree of inclination of the chalk determining the velocity of these currents, and together with it their motive power. “Upon the more level and elevated portions their influence has been feebly exerted, and the original debris of flints yet remains as the basis of the soil of the deep wold land; but upon the more inclined portions, not only has the original debris of flints been removed, but along with it great bodies of chalk, and by the degradation of the rock thus laid bare the present soil of the shallow wold land is formed. Indeed, the position of the shallow wold land, which is often found reposing at the steep angle of 30° upon the sides of the valleys, affords an additional proof of its being the result of the decomposition of the chalk rock; for it cannot in these localities be a sedimentary, neither is it a portion of any of the tertiary beds which may formerly have existed.”

As much greater progress has been made in the cultivation of the wold district during the present century than in almost any other part of Yorkshire, it may be well to give a slight sketch of the system adopted in this district. The surface soil of the Yorkshire Wolds is a chalky loamy soil, generally suited for the four-fold or alternate course of cropping, in which light and portable manures are easily brought upon the land, even to an elevation of 500 to 600 feet, and in which the fertility once attained by means of artificial manures is carefully kept up, partly by means of occasional top dressings of similar manures, but chiefly by consuming on the farms, by means of large flocks of sheep or house-fed cattle, everything that is raised from the soil, except the grain raised and the animals fed on the green crops.

The four-years' rotation on the Wolds is formed as follows:—1st, Turnips, raised with various kinds of artificial manures, and eaten on the ground by sheep; 2nd, barley; 3rd, clover and seeds; and 4th, wheat. This course may be said now to prevail universally, and the steady and successful pursuance of this system has at length led to the abandonment of the opinions formerly prevalent, that the Wolds were only adapted for sheep pastures, that the soil was unproductive, and that the returns were not equal to the expenses. This was no doubt the case during the great French war, when the high price of grain held out a strong inducement to raise corn crops, but when the means of procuring artificial manures were very deficient. It was near the close of the French war, about

the year 1812, when Mr. Strickland wrote his Survey, and when the light lands of this and other districts were in the most exhausted state, that he lamented the havoc which the plough had been suffered to commit on these beautiful and verdant sheep walks and pastures. At that time, however, the system adopted was the old outfield course, under which three crops of corn and a bare fallow were adopted. Even after the Wolds had been inclosed, and the present four-years' rotation had been introduced, it was for some time difficult to carry it on successfully for want of a light and portable fertilizer, such as bones or guano. But at the close of the war, bones began to be introduced in large quantities from the Continent, into Hull; and subsequently there have been introduced large quantities of guano from South America, together with artificial manures manufactured in this country.

To the turnip cultivation is attributable the large increase of produce, and the gradual amelioration of the soil. Between 1819 and 1844, the exports of wheat from this district by the Driffeld Canal increased from 8000 quarters to 26,000 quarters yearly, and the sacks of flour from 8000 to 23,000; from that time to the present, the improvement of the district has been still more rapid.

In the growing of turnips, which is the foundation of the whole system of the four-course husbandry, drilling is universal, no such thing as a field of turnips sown broadcast being now seen. Great pains are also taken in the thinning of the plants. Although the turnips are generally eaten on the land by sheep, the practice of winter feeding cattle has also been introduced. This has afforded the wold farmers the means of converting their straw into manure, which they did not before possess.

Although it is stated that deep soil is chiefly a characteristic of the high wolds, yet in the lower wolds it is also found occasionally, but only in a limited extent. The average breadth of this latter district has been said to be six miles. The direction of the valleys is the same here as in the other parts of it, viz., east and west, but the ridges are seldom prolonged so as to become flat table-land, and therefore, according to Mr. Thorpe's theory, they have not afforded a resting-place for the deposition of diluvial sediment so much here as elsewhere.

In parts of the Wolds extensive gravel beds occur; they are chiefly found distributed along the line of the valleys of denudation. In two of the most remarkable of these valleys, viz., in that of the

Dale Towns and in Thixendale, the surface soil consists almost entirely of gravel, which is composed chiefly of chalk and flint. In the broad valley of the Dale Towns this gravel bed is in some parts nearly a mile broad, and being thinly spread forms very useful convertible soil; but in the narrow Thixendale valley, the accumulation of gravel amounts in some parts to thirty feet in thickness; and, being finely comminuted and covered with a very thin coat of soil, is rendered incapable of holding tillage; hence, unless copious and frequent dressings of manure are applied to crops on this soil, the cultivation of it is found to be unremunerating.

Under the general term Wolds is included a tract of land lying at the foot of these hills at their northern border, and extending from Speeton Cliffs to Malton, a distance of twenty miles by two. It is in reality a portion of the vale of Pickering, but, being of inconsiderable extent, has been classified with the Wolds; to which, however, it has no other affinity than that of being immediately contiguous; for the soil, geologically, belongs (as will be seen by the map) to the Kimmeridge clay.

The Highland or Wold Farming of the East Riding.—Mr. William Wright in his excellent Report on the Agriculture of Yorkshire (1861), gives the following interesting particulars as to the progress of cultivation in what he calls the Highland district of the East Riding. "This," he says, "includes a large district called the Wolds, extending in a north-easterly direction from Hessle to Flamborough Head, and embracing some of the best farming to be found in this county, or perhaps in any other. Caird says of this district: 'It presents a very uniform and gradually inclined plane, joining the low land on the south-east, and rising to its greatest elevation on the north about 800 feet above the level of the sea, whence it gradually falls southward to an altitude of about 500 feet. The country is generally well inclosed by thorn hedges and plantations every where grouped over its surface, which add beauty to the outline, while they shelter the fields from the cutting blasts of winter and spring. Green pasture fields are occasionally intermixed with corn, or more frequently surround the spacious and comfortable homestead; large and numerous corn ricks give an air of warmth and plenty; whilst the turnip fields, crowded with sheep, make a cheerful and animated picture. The neatly trimmed hedges and well-built ricks show that the labourer is expert, and that the farmer likes to have his work well done.'

"There is no decline to record in the superior style of farming so long pursued by the spirited farmers in this district; and if we are unable to mention many improvements, it is because, comparatively, there was but little room left for them. A few, however, have come under our notice, of which perhaps the greatest has been effected by the free expenditure of the tenants' capital in the purchase of artificial manures. The able work of Liebig, now used as a text-book, has greatly increased the use of these manures, by imparting the knowledge required for their proper application; indeed, the recent researches of scientific men have clearly proved the inaccuracy of many principles which had previously been received as correct, and discovered many defective points in the management of manure, besides bringing to light those valuable artificial manures, with their use, to which the wold district is especially indebted for its present high cultivation. Under their guidance the use of bones, formerly bestowed with lavish extravagance, has been regulated, and hand tillages supplied in such quantities as to combine efficiency with due economy; many of them containing those elements which, when applied on the soil, retain the moisture or the gases of the atmosphere, thereby assisting the growth of the plant, as well as enriching the soil. Many tenants in this district expend annually, in artificial manure and oil cake, a sum equal to their rent.

"The improvements required of the landlord in this district have been limited to improved house accommodation, and to the erection of those new farm buildings which the requirement of the times made almost compulsory. There is yet much to be done in these respects, which it is hoped will ere long be fully carried out."

We add a few miscellaneous particulars connected with the natural history and the agriculture of the Yorkshire wolds.

The Supply of Water on the Wolds.—On the chalk wolds of the East Riding of Yorkshire, where there are no land springs, and where the fall of rain is much less than in the West Riding, the water used by cattle, animals, and to a great extent by man, is collected in ponds, so constructed as to retain the supply of the precious element even in the driest seasons. These ponds are usually circular in form, and generally from eighteen to twenty yards in diameter, though there is one in Sledmere Park thirty yards in diameter. When the diameter of the pond is twenty yards, the central depth ought to be eight feet; and so in like proportion, the

slope being gradual. The place usually selected for a pond is by the side of a road, in order to catch the water flowing down the ruts in heavy rain. This plan, however, is said to be condemned by experienced men, who consider it a better way to construct the pond where there is no such influx, and where its filling is made dependent entirely upon the fall of rain and snow from the heavens. It is said that the land floods bring with them large quantities of the larvæ of insects of various sorts, and worms, which eventually penetrate through the clay bottom and destroy the pond. The spot selected should be such as to make the pond available for three or four fields; if possible, on the tableland of the hills. When the necessary excavation has been made and the proper depth been obtained, the first thing is to cover the whole surface with clay, well rammed down to the thickness of four inches; then covered with an inch of quick lime, then a layer of straw, and then broken chalk over the whole, from eighteen to twenty-four inches in thickness. In general, ponds thus made are considered complete. An improvement, however, has been made in them lately which may be mentioned; viz., the making a trench or case, as it is termed, round the external circle, of broken chalk, three feet deep, and three broad. This trench must be filled with chalk rubble; and the object is to give a firm standage for cattle drinking at the pond, and to prevent the ill effects of their trampling and displacing the edges. It is thought that the wold ponds made in this way, and once filled, will never again be empty. Mr. Legard says that the large pond in Sledmere Park was apparently little affected by the drought of 1847—a year in which less rain fell than in any previous year of the present century.

Snow-storms on the Wolds.—Subject as these hills are to heavy snow-storms frequently as late as April, and destitute of shelter as some parts of them are, the lambing season is a very anxious time to the farmers, and requires the greatest care and attention on the part of the shepherd. Those ewes which are nearest to lambing are brought every night into the stackyard, or some sheltered part of the homestead, and are served with cut turnips. The ewe and her produce run together upon the summer pastures of clover, until the middle or end of July, when the lambs are weaned. Great losses are apt to take place amongst the lambs at these times. Nothing is found to be a better weaning pasture for young lambs than the aftermath of either sainfoin or clover.

On the Chalking of the Wolds.—Although the Wolds are almost entirely formed of chalk, it is found to be very advantageous to dress them with some eighty to a hundred cubic yards of chalk per acre, laid on in the autumn or winter, and dug from pits in the centre of each field. This practice has been adopted on the deep wolds, and is said to have been found beneficial in correcting the so-called sourness, to which those soils are liable. On the northern range of the Wolds—viz., on that long range which extends almost unbroken from Settrington Beacon to Hunmanby—the crops are found to suffer much from two causes; first, from a noxious weed, locally called “perry” (*Spergula arvensis*), which so infests the corn crops as almost to destroy them, and also from the well known disease which attacks turnips, called “fingers and toes.” In both these cases chalking has been found a complete remedy. It is said to be desirable that the chalk should be dug up at a time when it is most saturated with water, that the frost may the more readily act upon it, and reduce it to powder.

Sainfoin.—This plant, which has been cultivated at several places on the chalk soils of England, and which was said by Mr. Strickland to be an object of great and increasing cultivation on the chalk lands of Yorkshire, is now not much grown. At times when winter provender was obtained with difficulty, when turnips were scarcely known, a plant that flourished where scarcely any other plant would vegetate, seeking its nourishment from the tap root, and therefore adapted to porous calcareous soils, was highly esteemed; and its introduction into the East Riding was hailed as a great public advantage. It is said to have been introduced by the Osbaldistons, of Hunmanby, about the year 1740. Now, however, that turnip husbandry has become established, and the alternate system of cropping universally adopted on the Wolds, sainfoin has lost its original value. A field or two of it may here and there be seen, distinguishable from afar in the month of June by its beautiful scarlet flowers; but it is of rare occurrence, and now only sown either on very gravelly soil or on bare and craggy knolls. Mr. Legard mentions in his Report on the Farming of the East Riding, that the late Sir W. Strickland was an extensive sainfoin grower, and a zealous advocate for its extended cultivation. By his treatment of it, he was in the habit of obtaining as much as two tons of sainfoin hay per acre. He greatly deprecated the practice of eating the after-growth of it bare in the autumn, either by sheep or any other

animals ; because it was found that by this means the crown of the plant was exposed to winter frost, and that the crop would not then survive more than for seven years ; but that, on the other hand, by being content with the produce obtained from the scythe only, it would flourish for twenty years, or more.

On the east and south-east of the chalk downs or wolds of the East Riding lies the level and fertile district of Holderness, which forms the south-eastern extremity of Yorkshire, and runs along the sea coast and shores of the Humber to Spurn Point. The following are the most important and interesting particulars with regard to the district of Holderness, and the modes of cultivation adopted in it.

The Alluvial Lands of Holderness.—Holderness is generally, as its name implies, a low level tract of country. The name, however, implies somewhat more than this ; and, in truth, an accurate survey of the district fully justifies its etymology, for this long projection of flat land is more hollow in the interior than at the line of coast. This the watershed proves, all the water-courses in Holderness falling westward and south-west-ward from the coast towards the river Hull. The annual encroachments which the sea makes upon the clay cliffs have been accurately ascertained and measured, and several towns or villages have within the period of history been washed away, such as Auburn, Hyde, Ravenspurn, &c. ; so that, as the sea barrier then extended farther eastward, it was probably higher ground than it is at present ; and perhaps, therefore, when our Saxon ancestors named it, the title of Hollowder-Ness was even more appropriate than it is now.* The declination, however, from the east is inconsiderable, and thus in times when drainage was unknown, and the waters were permitted to flow as nature directed, an extensive swamp, called the Cars, was formed at the union of these sluggish streams with the river Hull.

It appears that no attempt whatever was made to drain these Cars until a comparatively recent period, but that they were permitted to remain a profitless morass, producing ague to the neighbouring district, and only affording shelter to the bittern and the heron. In the year 1761 an Act was passed, called “The Beverley and Barmston Drainage Act,” by which powers were given for straightening the river Hull, and confining it within an artificial embankment ;

* Another derivation, however, is Hol-deira-ness, or the promontory of the hollow land of Deira. In the Anglian times the province of Deira extended to the river Humber.

and also for making a subsidiary drain at a lower level, for the purpose of carrying off the flood waters of Upper and Middle Holderness, and for discharging them into the river Hull near to its mouth, by means of floodgates. This tidal drainage, however, proved insufficient after very heavy rains, and the Cars were inundated, notwithstanding. Another outlet, therefore, has been subsequently made, and the waters have been conveyed by a cut of some magnitude into the river Humber, about three miles below the town of Hull.

Most of the soils of Holderness belong to that portion of the tertiary formation, which was deposited during the glacial epoch. The alluvium of the eastern side of England extends, under many forms, from the south side of the chalk rocks of Flamborough Head over the whole of Holderness, and then appears to the south of the Humber, running along the Lincolnshire coast, as far as the Wash and the Fens, at the mouth of the Cambridgeshire Ouse, and on the coast of Norfolk. Most of the soils of this formation are very valuable for agricultural purposes, but the richest of them is the till or boulder clay, which is widely extended over this formation, and is found in a scattered form on many others. This soil is supposed by modern geologists to have been intimately connected in its origin, and the time of its formation, with what is called the glacial period. At that time a vast number of immense icebergs, like those which are still found floating every summer both in the Atlantic and the Southern oceans, and which frequently reach the Tropics before they are entirely dissolved, are supposed to have carried down portions of the soils and the rocks of ancient northern lands, and to have deposited them on the shores of warmer countries, or in the depths of seas, which have since become dry land by the gradual rising of the strata. Rich earths resembling or identical with what is now called the Till or the boulder clay, and vast numbers of boulders of granite, and other rocks, are now found scattered over many parts of England, Scotland, and Ireland. In some places the soil and boulder clay preponderate; in others the granite boulders are so numerous and large as seriously to interfere with cultivation. Nearly the whole of Yorkshire is covered, more or less thickly, with them boulders. Some of them are supposed to have been carried on floating icebergs from the mountains of the lake district, or more elevated regions; whilst others, and probably the greater part of them, have been borne to their present positions

by the violence of ocean currents. The deep rich soils which form so large a portion of Holderness, generally belong to this period.

This boulder clay is said to be the lowest member of the northern drift. It is largely interspersed with fragments of shells and rocks derived from older formations, and is of considerable thickness. It may be studied with advantage along the whole line of coast, from Burlington to Spurn Point. Occasionally, as at Barmston and Hatfield, a thin covering of drift sand is found reposing on the clay; and in one locality, viz., near Brandes Burton, there is a hill of gravel, which, though not of much agricultural importance, forms a rather singular feature in this district. There are several isolated hills in Holderness; none, however, attain a higher elevation than 100 feet.

The glacial drift of the East Riding has distinctive characters from those of central and south Lincolnshire. In the former, the coast sections exhibit the glacial clay separated into two portions. Of these the lower, identical with the ordinary (or upper) glacial clay of the south, contains abundant chalk debris; but the upper or purple portion (which is in places divided from the lower by sand or gravel beds) contains no chalk in the upper, and but little in the lower part of it, the place of the chalk being taken by swarms of palæozoic fragments. The latter of these clays extends over the Wold top at Speeton, and occupies the valley along the northern Wold foot, and so away northwards to Scarborough and the Tees' mouth; from which it is inferred that the north of England did not subside beneath the glacial sea until after the south had been submerged. The so-called Bridlington 'crag' is said to be an intercalated bed in this purple clay. Both these clays are found to be denuded, and their denuded edges to be everywhere covered by a much thinner boulder clay, that of Hessle, which wraps Holderness like a cloth, extending to altitudes of 150 feet, and running down the east of Lincolnshire to the Fen border. This post-glacial boulder clay of Hessle is again cut through, and in those places covered by posterior beds of gravel, one of which (at Hornsea) contains fluviatile shells. At Hull, this clay supported a forest, which is now submerged thirty-three feet below the Humber; the same submerged forest also occurring at Grimsby. It is supposed that the position of the sea during the post-glacial period, was principally on the west of the Yorkshire and north Lincolnshire Wolds until the formation of the gravel troughs, cutting through the Hessle clay; and that its present

position is connected with a recent westerly elevation and easterly depression. The glacial clay of central and south Lincolnshire belongs to the chalky portion, from which all the superior or purple part of the formation has been denuded; and the valleys of central Lincolnshire are cut out of the cretaceous series and glacial clay, as a common bed, the hills formed of the clay rising to elevations equal to the Wold in that part. The glacial clay of both areas is seen to be denuded westwards, and the denuded edges occupied with sands and gravels, termed denudation beds, which at first were supposed to be a portion of a tertiary stratum. The whole of the soils and formations of Holderness lie above the chalk formation, and belong to one or other of the tertiary strata. Much the greater part of Holderness, as already stated, is covered with the till or boulder clay belonging to the lower drift, which has been described as wrapping Holderness like a cloth, and running down the east of Lincolnshire to the borders of the Fens. It may be well, however, to give a brief description of the strata lying above the chalk, though they are very unequally developed in this part of Yorkshire.

The crag, or mammalian crag, is the lowest of these deposits. Some doubt exists whether what is called the Norwich crag is found in Holderness, and this has been a matter of dispute among geologists. It is stated, however, that this formation is found upon the Yorkshire coast at Bridlington, where it is said to have become visible after high tides had exposed the lower strata on the northern side of the harbour, and near the pleasure-ground called the Esplanade. Its appearance is that of a shelly bed, resembling the London clay; but the fossils are said to have the character of those found in the crag formation. The crag consists of a marine or fluvio-marine deposit, of very irregular thickness, containing the bones of elephantine and other mammoths of extinct species, accompanied by marine shells, mixed in some places with fresh-water shells, a large portion of which belong to existing species. Its most constant member consists of a collection of large chalk flints, two or three feet thick, embedded in a base of ferruginous gravel and sand resting on the chalk, and mixed with marine shells. It is in this part of the deposit that the bones and teeth of elephants and other mammalia found in the Norwich crag principally occur. In other parts it consists of beds of sand and

gravel varied in depth to more than twenty feet. In a paper on this formation by Mr. S. P. Woodward, F.G.S., A.L.S., it is stated that "investigation has led to the somewhat unexpected result that the Bridlington deposit can no longer be considered the exact equivalent of the Norwich crag in age or in climatal conditions." Of the sixty-three shells found by Mr. Leckenby and Mr. Bean at Bridlington, only thirty-five are common to the Norwich crag. In order to compare the Bridlington shells with those of the northern drift, Mr. Woodward prepared a list of 134 species, chiefly from the Clyde beds, and belonging to the close of the glacial period. Of these only forty-two were common to Bridlington, a resemblance scarcely exceeding that of the Norwich crag; whilst only twenty-nine of the Clyde shells were found to be Arctic, a proportion nearly the same as in the last-mentioned deposit. It follows that the Bridlington shells are almost equally distinct from those of the last pre-glacial and the first post-glacial deposits, and are much more Arctic than either, as if formed during the climax of the last great age of cold in Britain. The fresh-water beds are not extensively developed in Yorkshire, but the subterranean forest beds occur along the coast of Holderness.

More recent than the crag is the forest bed which is found lying underneath the glacier drift on the eastern side of England, especially at Cromer in Norfolk, and at some other points along the eastern coast. This bed has been traced for miles between high and low water mark, and contains numerous stumps of the trunks of Scotch fir, spruce, yew, alder, oak, together with remains of three varieties of elephants, rhinoceros, hippopotamus, horse, pig, and other mammalia; the whole, according to A. C. Ramsay, speaking of a past physical geography, at least during part of which a mild climate prevailed, and this country may have been joined to the Continent.

In concluding this brief notice of the geology of this part of Yorkshire, we add the following particulars with regard to the granite boulders which are found scattered over nearly the whole of the county, chiefly from the pen of Professor John Phillips. He states that for more than thirty years his attention has been earnestly fixed on the remarkable facts which have been observed by Professor Sedgwick and himself in regard to the dispersion of granite blocks, from Wasdale Crag, over high and low ground, across Yorkshire and certain tracts of neighbouring counties. While in the drainage of the Eden and the large tracts embraced by the northern and eastern

branches of the Humber, and the long depression on the western side of the carboniferous chain of Yorkshire and Lancashire, these blocks occur even plentifully, they are quite unknown in every part of the country to the westward of the parent rock. In tracing the course of the blocks from the extreme south-east of Yorkshire back to their origin, it is found that they by no means follow the valleys and avoid the heights, but that on the contrary, with little or no difference, they occur alike on hills and dales, though not on the very highest, until on Stainmoor, at the extremity of Yorkshire, they appear on surfaces raised 1400 feet above the sea. Through this pass of Stainmoor, which, though so much elevated, is, in fact, a great transverse depression in the carboniferous chain, the blocks have passed on through a strait of an ancient sea. At no other point have the blocks crossed the chain. Turning now to the west, he remarks that in all the intermediate country, whether elevated to about 1000 feet above the sea, or only to about 500, the blocks of granite are frequent; and on approaching the site from which all have passed, they grow so numerous as even to be counted by hundreds and thousands.

The blocks are often of very large size; some within two or three miles of the Crag are twelve, fourteen, eighteen feet, and even more, in the largest dimensions; and at Thirsk, seventy miles off, a block was found thirteen feet in diameter.

They seldom appear to have been rolled, but yet, perhaps by ordinary surface waste, they have often become blunted at the angles. On the whole, the author is convinced by his frequent examination of the phenomena, 1, that their distribution to such great distances, in directions not conformed to natural courses of drainage, can be best explained by the agency of ice. 2. That it cannot have been effected by glacier movement on the land at its present absolute elevation. 3. That it cannot have been produced by iceberg flotation in an ocean, if the present relative elevation of the country was then the same as now. 4. That the excessive abundance of blocks near the Crag, and in the region fronting it to the east, seems to require the supposition of a considerable disturbing force, which greatly shattered the Crag, and provided a large quantity of removable blocks before the ice action came on.

On the whole, the author supposes that during the glacial period such a disturbance took place; that the Lake district was depressed; that icebergs formed from shore ice, and at moderate depths in the

sea, carried away many of the loosened blocks over the region far away to the east, while that was relatively lower than it is at present, and that afterwards the distribution of the blocks near Wasdale Crag took place while the land was rising. He computes roughly, that if the blocks now visible in the region round Wasdale Crag were restored to it, and placed in the granitic area now exposed, they would cover it in every part to the depth of about three feet. The blocks of stone now seen to be loosened around the Crag, and lying against its steeps would not amount to one-thousandth of this quantity ; from which the author draws an argument in support of his views of the preparatory concussions necessary to provide enough masses for the ice to transport. On another point of some difficulty he observes that near the Crag, and at small distances from it, the quantity of other stones distributed with the granite is relatively very small, and the masses are of small magnitude. At very great distances, as sixty or eighty miles away in Yorkshire, this disproportion as to quantity is less remarkable ; but the granite blocks are still usually the largest.

The Agriculture of Holderness.—The southern part of Holderness, bordering on the river Humber from Hull to Spurn Point, and comprising many thousand acres, is entirely alluvial, and the soil is of great fertility. That part of it which is still called Sunk Island, though no longer isolated, was first noticed and reclaimed from the tidal waters of the Humber, in the time of Charles I. It appears that at first 1600 acres were embanked, and leased to certain individuals ; and that in 1848 Sunk Island contained within its banks 4700 acres, having a chapel and several farm-houses erected upon it. There were persons recently living who could remember vessels sailing betwixt the island and the mainland, to which it is now united by a bridge across a very narrow channel.

In Mr. William Wright's Prize Report on the Farming of Yorkshire, we find some additional particulars as to the regaining of land from the sea, near the mouth of the river Humber. Writing in the year 1861, he says, that considerable additions have been made to the crown lands by embanking, inclosing, and converting the land into farms. The improvements have been made by the Commissioners for the Woods and Forests, and have been carried on by them in a most spirited manner, both as regards farm buildings and drainage. About the year 1850, nearly 700 acres of excellent land were added to the estate by means of embanking. The new

land is most valuable, and requires little manure for many years; showing, by the natural and luxuriant growth of white clover, the richness of the soil, and its capacity for producing the largest crops. In addition to Sunk Island, about 400 acres of new accretions have been added to Patrington, and a considerable portion to Ottringham, Welwick, and other places in the immediate neighbourhood. Upwards of 10,000 acres had been so reclaimed and converted into valuable farms, between the years 1668 and 1850, when the embankment was completed.

The quantity of land between Hull and Patrington protected by embankments, and entirely formed of soil deposited by the waters of the Humber, is not less than from 20,000 to 30,000 acres. An extensive farmer, whose farm is situate on this land, says—"The only variation which appears to exist on my farm is in the mechanical division of the soil, caused by the various currents of the Humber when the waters have deposited the warp; where the coarser particles of soil are left, composed of siliceous and calcareous sand, with broken shells, there the soil is freer and very much superior for cultivation, though for grazing some of the other parts are quite as good. The rest of South Holderness is undulating, mostly good land, composed of gravelly hills, and reddish brown clay soil, mixed with rounded stones and pieces of white marl or soft chalk. Nearly the whole of this land is under the plough, at least eight-tenths of it; while the warp land, within the last few years, was nearly half of it in grass. But the losses caused by epidemic diseases amongst cattle and sheep have been so great, that a large quantity of this grass has been ploughed up. The size of the farms varies upon the warp lands from 200 to 800 acres; but upon the higher land there are many farms of less than 200 acres." The author of this description, Mr. Mansfield Harrison, of Keyenham Marsh, says—"In the cultivation of my farm I have endeavoured to keep three objects in view, viz., to cross my crops as much as possible; to avoid dead fallows as long as I could keep my land clean without them; and never to sow a crop when the land was out of condition. Upon the freest, and what I consider my best land, I have usually fallowed, with a plentiful dressing of manure, for rapeseed to stand for a crop, which is generally off the ground by the beginning of July. I immediately plough the land up, and work it well with the drag, and, if it requires it, give a second ploughing for wheat. This is almost always my best wheat crop. The next

year I sow beans, about fifteen inches apart in the drills, horse-hoed twice and hand-weeded twice; indeed, as long as we can get amongst the crop without doing harm. I give the bean-stubble a light dusting of newly-slaked lime, while the dew is on, to kill the grey slugs; then plough for wheat; then afterwards fallow again. On another portion of my farm I fallow for wheat without any manure, as I commonly get far too much straw; then clover seeds, to pasture and mow; then wheat. I manure the wheat-stubble well for oats; then beans and fallow. The next time, I take wheat, oats, beans, wheat, beans. I have sometimes taken after fallow, wheat, beans, wheat, beans; but the bean crop is so extremely hazardous that I do not find this a profitable course. I have tile-drained the greatest part of my farm, and find it to answer well. The land will evidently bear greater extremes of both wet and dry without injury. In the cultivation of the higher land in South Holderness, wherever it is light enough to grow turnips, the four or five course system is adopted; but by far the greater part is too strong for turnips. The usual course on stronger land is to dead fallow for wheat, with a dressing of foldyard manure or lime—say, from three to five chaldrons to the acre; then seeds, wheat, oats, beans, where the land is good; but on the inferior land the oat crop is not taken. Tile-draining upon this land, when carefully done, and where the drains are laid in two and a half to three feet deep, has done more to increase the produce than anything that has been before introduced. Although there is no more grass land to break up, the produce has been very much increased, principally by deep ploughing and better draining.” The writer adds—“I have no hesitation in saying that the land, where properly cultivated, is improving every year. I cannot help feeling surprised at the prejudice which a great number of landed proprietors, in some districts, have to the breaking up even of inferior grass land, from the fear of having their estates deteriorated. Let them secure and encourage a good tenant, and their estates will improve instead of getting worse; while the wealth produced in the country from an acre of well cultivated land, is at least four times greater than from the same land under inferior grass.” On the higher land of Holderness wherever it is gravelly, or light enough to grow turnips, the four or five course system is adopted. On the stiffer lands the rotation consists of seeds, wheat, oats, and beans.

Cattle, Sheep, and Horses, of the East Riding.—Cattle, sheep, and horses form a most important portion of the wealth and of the products of the East Riding. It is by means of sheep and turnip husbandry that the rich cultivation of modern times has been rendered possible on the more elevated parts of the Wold district. The following particulars with regard to the cattle, sheep, and horses of this district, are chiefly from Mr. George Legard's "Prize Essay on the Agriculture of the East Riding:"—

With regard to the cattle of the East Riding he observes, that although the subject of cattle cannot be said to belong exclusively to this section of the Riding, yet it will be more convenient to treat of it here. In Mr. Strickland's time (1812), "the Holderness or short-horned breed, remarkable for their large size and abundant supply of milk," were said to prevail universally throughout the East Riding. This breed of cattle does not seem to have been indigenous, but to have been introduced at some early period from Holland and the north-western parts of Germany. Their colour is described as being generally red and white, or black and white, and in some cases mouse or dun colour, on a clear white ground. The great improvement, however, which began to be made about sixty years ago in the class of short-horned cattle, on the banks of the Tees, has now extended into the East Riding. Bulls and cows of a finer description, of the stocks of the accredited northern breeders, have found their way hither, and have caused the old Holderness breed to disappear. It may, perhaps, have been remarked, that the cattle of this Riding, especially of Holderness, are of a large frame, and have a disposition to milk rather than fatten. It is to be doubted, however, whether this has not proceeded from the taste of the stock-owners, rather than that any remnant of the old stock still exists. No part of the East Riding can be called, as it was in 1812, "an entirely breeding and grazing country." In Holderness two-thirds are probably under the plough. The vale of York possesses very little land with grazing qualities. The Wolds, as must be known to all who are conversant with chalky tracts, are more adapted for sheep than cattle. Consequently it is found that few farmers keep a larger dairy than is sufficient for the wants of their family. The advantage of economizing the straw of a farm, and of converting it into good manure, has been alluded to, and the defect observable in this particular in wold farms has been pointed out. This defect, however, is not

confined to the Wolds. The management of strawfold cattle throughout the Riding is capable of great improvement. If a small allowance of turnips, or of oil-cake, or of the linseed compounds so much in vogue now-a-days, were given in addition to the straw, a very important benefit would be conferred, not only upon the fertility of the individual farm, but also upon the resources of the whole community.

On the subject of Sheep, Mr. Legard observes, that the Wolds have no doubt, from time immemorial, been considered a sheep-breeding district, and it is probable that the quality of the animal fed and bred upon them was proportioned to the prevailing condition of the district; for we find, according to Arthur Young, in the year 1777, when open downs and pastures were its characteristic, that the wold breed of sheep was a small, hardy, compact animal, accustomed to travel far for its food, and producing a short, thick, close fleece of wool, which enabled it to resist the cold of the climate; that when fat (which was not till four years' old) it weighed twelve or fourteen pounds per quarter, and the fleece weighed three pounds at a medium, worth, at the price of the period, about two shillings.

Subsequently an attempt was made to increase the size and wool of the animal by introducing a cross from Lincolnshire: the two races, however, were so dissimilar in qualities, that the admixture of blood did not succeed; and the breeders soon found out their error, and substituted the Leicester for the Lincolnshire ram. By this means they improved the wool and produced a finer form, with a greater aptitude to fatten. At the present day the breed of wold sheep may be said to be essentially Leicester.

"The late Sir Tatton Sykes, from his early and zealous attention to agricultural matters, and especially to sheep breeding, may be said to have fixed and established the character of the wold sheep. His own flock were rather small in size, but highly symmetrical, with a great inclination to fatten. Mr. Robinson's sheep were of a larger mould, and they were held in high estimation, not in this Riding only, but were sought after from distant parts of the country. An attempt was made several years ago, by the late Mr. Osbaldiston, of Hunmanby, and by Sir William Strickland, of Boynton, to introduce the breed of South Downs, and it was persevered in by these gentlemen for many years. It did not extend, however, to others; and at present this description of sheep is not to be found within this district, except in the hands of a few amateurs."

The Horses of the East Riding.—With regard to the horses of the East Riding, Mr. Legard states that this part of Yorkshire has been long celebrated for its breed of horses, and this celebrity, in some measure, continues. The Yorkshire bays are still in request for London carriage-horses, and most of these are bred in parts of Holderness, in the neighbourhood of Bridlington, &c. Formerly a large, powerful, long animal was required for carriage purposes; the fashion of the present day has, however, changed in this particular, and now it is necessary that the London carriage-horse should be three parts, at least, thoroughbred. Consequently, all traces of the original pure coaching breed, or Cleveland bay, as it was termed, are nearly obliterated. At Howden Fair, which is amongst the largest in England, three-year-old colts of this description are brought forward in considerable numbers to meet the demands of the London and other dealers.

There is nothing peculiar in the draught horses of the East Riding. Some farmers adhere to the black cart breed, a stout, large-framed animal, as being the best adapted for drawing heavy weights in single-horse carts. In general, the draught-horses are of a mixed character, and on the Wolds they are not without some infusion of blood, or at least of coaching blood, the chief desideratum on the light soils being activity in stepping.

Howden great April Horse Fair, 1870.—These great horse fairs fully maintain their high reputation to the present time. At the April fair of 1870, there was a large muster of horse dealers and breeders, who were met by a large supply of well bred and superior classes of horses. Young horses suitable for breaking for private harness were in active demand, and many stables were sold at 65 and 85 guineas each horse; whilst horses broken and settled down to work, and well matched pairs of handsome young carriage horses, realized 220 to 300 and 350 guineas. Small horses and second-rate horses of this class brought 50 to 60 guineas; riding horses brought 50 to 75 guineas, and those of superior stamp 80 to 120 guineas; neat-going cobs, 35 to 45 guineas; trotters, 30 to 60 guineas; and seasoned harness horses, roadsters, &c., 20 to 30 guineas. Hunters sold at 60 to 80 guineas, and those of a high pedigree at 90 to 150 guineas; horses suitable for carriers, railway, and town work, 40 to 55 guineas, and common sorts, 25 to 30 guineas; horses for omnibus and hackney work, 30 to 45 guineas; cart horses of high class, 50 to 60 guineas; secondary horses and

colts, 28 to 40 guineas. This great north country horse show was kept open on Thursday and Friday. Many strings of horses were intended for London, and the unsold horses were sent forward to the Lincoln April horse fair.

Condition of the Agricultural Labourer in the East Riding.—Mr. George Legard in his Report on the Agriculture of the East Riding, says, that there is no part of the kingdom where the wages of the agricultural labourer rule higher than in the East Riding, and quotes the following rates of wages as prevailing in the year 1848. Since that time there has been a considerable advance of wages, to which we shall refer more fully in a subsequent chapter.

Yearly servants, with board and lodging—foreman, from £22 to £25; waggoner, from £14 to £16; shepherd, from £21 to £23; ploughboys, from £8 to £12. Day labourers, with board, from Martinmas to Candlemas, 7s. to 7s. 6d. per week; from Candlemas to Harvest, 7s. 6d. to 8s. 6d. per week. Day labourers, without board, from Michaelmas to Candlemas, 12s. per week; from Candlemas to Harvest, 13s. to 14s. per week. Harvest wages, with board, best mowers, 17s. per week; binders and stokers, 14s.; gatherers, 12s. to 13s. Harvest work per acre—wheat, 7s. 6d.; grass mown per acre, 2s. 9d. to 3s., with beer. Thrashing per quarter of grain by hand—wheat, 3s. 6d.; barley, 2s.; oats, 1s.; beans, 1s. 3d.

Cottage allotments as a system were first introduced into the East Riding by the late Lord Wenlock of Escrick Park, soon after he succeeded to the Escrick estate, about the year 1823. Among other plans for the amelioration of the condition of the agricultural labourer, he established cottage allotments in each township on his property.

Agriculture of the East Riding according to the Returns Published, 1870.—The agriculture of the East Riding, like the soil, the climate, and the population of that Riding, differ greatly from those of the West Riding. The climate of the East Riding is much clearer and drier than that of the West; the soil is almost everywhere favourable to the growth of the finer kinds of corn; and the heat of the summer months, as well as the dryness of the atmosphere, are very favourable to the growth of wheat and barley.

The area of the East Riding is returned at 771,139 acres, including the city of York. Of this quantity of land no less than 646,465 acres was under crop, bare-fallow, and grass in 1868;

and 668,712 acres in 1869. The quantity of heath and mountain land in the East Riding is not more, if so much as 100,000 acres; and the extent of permanent pasture, which is not broken up in rotation, is not more than 155,008 acres. The quantity of arable land in the East Riding is somewhat larger than the quantity of arable land in the West Riding, although the West Riding is more than twice as large as the East Riding. From these causes, and some others, the agriculture of the two Ridings differs in almost every respect.

In the East Riding, considerably more than one-third of the whole of the land is under corn crops. The quantity of land under corn crop in 1868 was 274,800 acres, and in 1869, 288,493 acres, out of a total acreage of 771,139. The quantity of wheat grown in the East Riding in 1868 was 123,268 acres, and in 1869, 130,774 acres; of barley, 45,988 acres in the former year, and in the latter 48,123. The quantity of oats grown in 1868 was 81,175 acres, and in 1869, 78,607; of rye, 2227 and 2,472; of beans, 13,370 and 16,555; and of peas, 8772 acres and 11,962. Thus the total quantity of land under corn crops in 1868 was 274,800 acres, and in 1869, 288,493 acres. Nothing but a well arranged system of turnip husbandry could render it possible to raise so large a quantity of corn in successive years. The total quantity of land under green crops in the East Riding in 1868 was 110,318 acres, and in 1869 109,641 acres. In addition, the quantity of flax grown in the former year was 1892 acres, and in the latter 2678. The extent of the clover and grasses under rotation was 87,117 acres, and in 1869, 77,263. There were 27,324 acres of bare-fallow or uncropped arable land in the former year, and 24,141 in the latter.

The quantity of permanent pasture, meadow or grass land not broken up in rotation, was 155,008 acres, in 1868, and 166,396 in 1869. This was exclusive of heath and mountain land, which amounted to from 50,000 to 80,000 more. The natural pastures of the East Riding, of all kinds, probably do not amount to more than 240,000 acres, but the quantity of food for cattle and sheep raised on the four-course system of husbandry is very great. The number of sheep in the East Riding, in the year 1868, was 593,056, and in 1869, 539,981. The number of head of cattle in the former of these years was 77,206, and in the latter, 76,886. The number of horses in 1869 (the first year for which the return was made)

was 40,622, in the hands of farmers alone; the number of pigs, 45,879.

In 1868 the average size of the East Riding farms was seventy-eight acres, and in 1869, seventy-seven acres. In the same two years the average size of the North Riding farms was fifty-one acres; of the West Riding thirty-seven and thirty-six acres; and of the whole of England, sixty and fifty-eight acres. The farms of the East Riding are therefore about twice as large as those of the West Riding, and they are nearly one-fourth larger than those of England generally. This is clear evidence both of an extensive and a superior system of agriculture. This is equally proved by the fact, that the per centage of corn crops to total acreage, under all kinds of crops, bare-fallow, and grass, in the East Riding, amounted in 1869 to 43·1 per cent. of the whole quantity; whilst in the same year the proportion of corn crops in the North Riding was not more than 28·8 per cent.; in the West Riding, 23·5 per cent.; and in the total of England, 33·4 per cent.

Progress of Population in the East Riding of Yorkshire.—The population in the East Riding, in which employment depends almost exclusively on agriculture, has increased much less rapidly than in the West. The only part in which there has been a rapid increase is in the town and port of Hull, where a continually increasing commerce has brought together a large population. But the increase of the East Riding is more than equal to the average increase of England and Wales. The following table shows the amount of increase, in the different districts of the East Riding, during the present century:—

District.	Area in Acres.	Population.			Num. of persons to square mile.
		1801.	1851.	1861.	
York.	96,683	29,244	54,257	59,909	378
Pocklington,	107,636	10,637	16,098	16,710	96
Howden,	72,253	9,823	14,436	15,001	128
Beverley,	78,434	12,748	20,040	21,029	164
Hull,	1,827	22,161	50,670	56,888	17,750
Sculcoates,	45,084	13,487	44,719	51,956	635
Patrington,	88,872	5,947	9,407	9,681	68
Skirlaugh,	67,028	6,150	9,279	9,654	89
Driffield,	105,114	8,894	18,265	19,226	111
Bridlington,	67,984	8,150	14,322	14,371	135*

* England and Wales:—Registration district, number of persons to a square mile in registration district. Census of Great Britain, 1851, vol. i. table 21, p. cxi.

PROGRESS OF POPULATION IN THE EAST RIDING OF YORKSHIRE, IN
THE PRESENT CENTURY.

Pocklington.—Pocklington is a town in the wapentake of Harthill, division of Wilton Beacon, and in the parish of the same name. It has a considerable trade in corn, flour, timber, lime, coal, and other articles; and a canal, constructed under the authority of an Act passed in the year 1814. Here is a nobly endowed free school, for teaching the ancient languages and other branches of knowledge, and also a national school.

The registration district of Pocklington is very extensive, covering an area of 107,636 acres. In 1801 the population of the district was 10,637 persons; in 1851, 16,098; and in 1861, 16,710. The number of persons to the square mile in the district of Pocklington, which depends almost exclusively on agriculture, was 96, at the census of 1851.

Howden.—Howden, in the wapentake and liberty of Howdenshire, is a good market town, in the parish of the same name. It has a station half a mile distant on the Great Northern Railway. The district called Howdenshire was long under the dean and chapter of Durham. At Howden the church was collegiate until the first year of Edward VI., and the bishops of Durham had an ancient palace there, with a park extending to the banks of the Ouse. The town of Howden is situated a mile or two from the Ouse, and has a small harbour for boats, and for ferrying over the river. In the market place there is a large building called the Moot Hall, in which the courts for the jurisdiction are held. There is a free school. The fairs of Howden are very much frequented, and are celebrated for the great number of fine horses exposed for sale. The fair, which is held in September, extends over six days, towards the end of the month.

The registration district of Howden extends over 72,253 acres. In 1801 it contained 9823 inhabitants; in 1851, 14,463; and in 1861, 15,000. The number of persons to the square mile in the Howden district at the middle of the present century was 128, according to the census of 1851.

Beverley.—Beverley is in the wapentake of Harthill and the liberty of Beverley, and is a place of great antiquity. The church, or minster, was built in very early times, and was re-edified by John of Beverley, archbishop of York, in the year 704. This

church was afterwards destroyed by the Danes, who murdered a number of the monks, canons, and nuns. Another church was built on the same spot by Athelstan, the grandson of Alfred the Great, and was endowed with extensive gifts and privileges. The ancient name of Beverley was *Beverlac*, the place or lake of beavers, with which animal the neighbouring river of Hull then abounded.

The registration district of Beverley covers an area of 78,434 acres; in 1801 it contained 12,748 persons; in 1851, 20,040; and in 1861, 21,029. The number of persons to the square mile in the Beverley district at the middle of the present century, was 164, according to the census of 1851.

Hull.—Kingston-upon-Hull, more generally known as Hull, is the third seaport in the United Kingdom, being exceeded only by London and Liverpool in the extent of its trade and shipping. It is one of the oldest parliamentary and municipal boroughs in England, and has a population of more than 100,000 inhabitants.

The registration district of Hull merely includes a portion of the borough, extending over an area of 1827 acres. In 1801 this small district contained 22,162 inhabitants; in 1851, 50,670; and in 1861, 56,888. But a large portion of the population of Hull resides in the adjoining district of Sculcoates. In Hull itself however, the population is very closely crowded together. At the census of 1851 there were no less than 17,750 persons to the square mile, on the area of 1827 acres, included in the Registration district of Hull. Nearly half the population resided beyond those limits, chiefly in the district of Sculcoates, which extends over an area of 45,084 acres.

Sculcoates is an extensive district, including the suburbs of Hull and a large rural district, extending altogether over an area of 45,084 acres. In 1801 this district contained 13,487 persons; in 1851, 44,719; and in 1861, 51,956.

Patrington, in the wapentake and liberty of Holderness, is supposed by Camden to stand on the site of a Roman station, and about sixty years ago the remains of a Roman altar were discovered there. A navigable creek of the Humber, called Patrington Harbour, comes within about a mile of the place, and maintains a small trade in agricultural produce, and in lime and coal. The church is a beautiful Gothic structure, in the form of a cross, dedicated to St. Patrick.

The registration district of Patrington covers an area of 88,872 acres, and includes the greater part of the rich and fertile peninsula of Holderness. The population of this district in 1801 was 5947 persons; in 1851, 9407; and in 1861, 9681. Patrington is a purely agricultural district, and the most thinly peopled portion of the East Riding. In the year 1851 the population of the Patrington district was not more than 68 persons to the square mile.

Skirlaugh is a pleasant village and chapelry on the old high road from Hull to Hornsey, being distant about nine miles from the latter place. Bishop Skirlaugh, who died in the year 1405, was a native of this place, and rebuilt the chapel, which has been frequently repaired since that time. Skirlaugh is the principal village in the registration district of the same name, which extends over an area of 67,028 acres. In 1801 this district contained 6150 persons; in 1851, 9279; and in 1861, 9654. Skirlaugh is chiefly an agricultural district, and, at the census of 1851, contained a population of 89 persons to the square mile.

Driffield.—Driffield (Great), in the wapentake of Harthill and the division of Bainton Beacon, is a well-built market town, situated at the foot of the Wolds. The river Hull takes its name at this place, being formed by the confluence of a number of fine trout streams. These unite near the town and form the river Hull, which has been rendered navigable from Driffield to the Humber. The town is the chief place of an extensive district, rich in corn and cattle, the latter of which are of the finest breed. There was formerly a castle at Driffield, which was one of the residences of the earls of Albe-marle, and afterwards of the dukes of Lancaster. The neighbourhood of Driffield is very healthful as well as beautiful, and abounds with gentlemen's seats.

Driffield (Little) is about one mile north-west of Great Driffield, and is said to be the burial-place of one of the old Anglian kings of Northumberland, who died here in the year 702. The whole of this country is rich in British and Saxon antiquities.

The registration district of Driffield is of great extent, reaching over an area of 105,114 acres. In 1801 it contained 8894 persons; in 1851, 18,265; and in 1861, 19,226. The chief resources of Driffield are created by its very superior agriculture, and by the trade to which that gives rise. In 1851 the number of persons to the square mile in the Driffield district was 111.

Bridlington.—Bridlington stands on the eastern coast about a

mile from the sea-shore, in the recess of a fine bay which bears the same name. Its situation is pleasant and salubrious, and it is much frequented by visitors, both for pleasure and for health. The priory stands at the east end of the town, is pleasantly situated, and commands a fine sea-view. It was founded by the Norman baron, Gilbert de Gant, early in the reign of Henry I. The church of the priory appears to have been a noble building. William of Newburgh, an early English annalist, was a native of Bridlington, but having become a canon of Newburgh he took his name from that place; and George Ripley, a learned alchemist in the reign of King Edward IV., was a canon of the priory.

Bridlington Quay, in the parish of Bridlington and close to that place, is a pleasant and healthful sea-bathing place, much frequented in the bathing season. The harbour was constructed as a place of refuge for vessels navigating these stormy and dangerous seas, and is formed by two piers, which extend for a considerable distance into the sea.

The registration district of Bridlington extends over 67,984 acres. In 1801 this district contained 8150 inhabitants; in 1851, 14,322; and in 1861, 14,371. The number of persons to the square mile in the Bridlington district, at the middle of the present century, was 135, according to the census of 1851.

York City and District.—The city of York, the capital of the whole county, and the most ancient and celebrated city in the north of England, still shows undiminished signs of life and energy, after flourishing for nearly two thousand years. Within the present generation, modern York has become the centre of a great railway system, formed of lines of railways traversing nearly the same districts of country which were intersected by the Roman roads of ancient times; and this has brought the ancient city into the full stream of modern life and activity. The result has been that the population of the city of York, and of the census district extending around the city, and covering an area of 82,912 statute acres, has pretty nearly doubled during the present century. At the census of 1801, the city of York and the census district connected with it contained 29,244 persons. Fifty years later, at the census of 1851, the number of persons residing in the city and the census district had increased to 57,116 persons. At the census of 1861 the number had still further increased to 59,909 persons, and it is now no doubt considerably more than 60,000. The number of persons to each

square mile in the district of York, at the middle of the present century, according to the census returns of 1851, was 378 persons, or a little more than the average rate of population throughout the kingdom. York stands in the centre of a rich agricultural district, resting on the new red sandstone, and has the advantage of a fine river, the Ouse, flowing through the middle of the city. In addition to this, it derives many advantages from being the capital of the county, the see of an archbishop, and the great centre of communication between the north-eastern and north-western parts of the kingdom, as well as between England and Scotland.

The Commercial Position of the East Riding.—In addition to the great agricultural resources of the East Riding, it has the advantage of possessing the best and safest seaport on the north-eastern coast of England. The port of Hull owes its existence, and its great commercial advantages, to its position on the estuary of the Humber, at the point at which the river Hull flows into that estuary. Together they give the security and the depth of water required for the large ships of modern times. There are several other places on the estuary of the Humber, and even on the rivers Ouse and Trent, which have in former ages possessed considerable commercial activity, and that even have it at the present time; but there is no other place which has been found to possess so many advantages as the port of Hull. Hence it has taken the lead of all the ports within the Humber, and indeed of every port between the Thames and the Tyne. Nor do there seem to be any perceptible limits to the progress of the port, for it is the outlet and inlet of the commerce of the most extensive valley or district of England, namely, that of the Ouse and Trent. At numerous points along the banks of the streams which discharge their waters into the Humber, all the branches of industry which create and sustain a great commercial activity are carried on with continually increasing energy. Hull is not only the port of a rich agricultural district, extending over nearly 10,000 square miles of land, but it is also the port, so far at least as European commerce is concerned, of the most extensive coal-field and manufacturing district in England. On this stand the towns of Leeds, Bradford, Halifax, Huddersfield, Wakefield, and the crowded villages of the woollen and worsted districts. It is also the outlet for the rich coal districts of South Yorkshire, around Wakefield and Barnsley; and for the iron and cutlery trades of Rotherham and Sheffield. Still further

to the south, Hull is the eastern outlet for the hosiery, the lace, and the silk trades of Derby, Nottingham, Belper, and Leicester. Hull thus divides with Liverpool the commerce created by the manufacturing industry, and the iron and the coal, of the northern and central districts of England. It also divides with the port of London the extensive trade with the Continent of Europe. From the earliest times, even before the discovery of America by Columbus, the ships of Hull carried on the fishing of the Arctic Seas, even extending their adventures as far as the island of Iceland and the coasts of Greenland. The trade in what was called stock fish, that is, dried fish, was carried on from the port of Hull previous to the time of the Tudors, and was the source from which the De La Pole family, the merchant princes of Hull, acquired the wealth which first opened to them the peerage, and afterwards led to a connection with the crown.

From the great abundance of coal, suitable for the purposes of steam navigation in those districts of Yorkshire and Nottinghamshire which have their cheapest and easiest access to the sea at the port of Hull, the introduction of steam navigation in the Humber has given a greater impulse to the commerce of Hull, than to that of almost any other English port. This we shall show more fully when we come to describe the commerce of Hull in our general account of that port. We mention it now in passing as one of the chief causes which have in modern times given new life and fresh vigour to the commerce of the Humber.

Another great cause of the rapid progress which the commerce of Hull is now making, is the removal of the duties on corn, cattle, and provisions, on timber, and on all kinds of raw materials. In early times these were amongst the principal resources which sustained the commerce of Hull; but for a considerable period nearly all those articles were subjected to heavy duties, from mistaken notions of national policy. Happily the world, or at all events that portion of it in which we have the good fortune to live, has become wiser in the present generation. Hence there is now no longer any impediment to the great commerce of the port of Hull, which consists chiefly in the exchange of the manufactures, the metals, the coal, and the cutlery of the northern and midland counties, for the corn, the wool, the hemp, the flax, the cattle, and the raw materials of the Continent, in addition to colonial and tropical produce from more distant countries. There is no trade

which rests on a more natural exchange of extensive and useful commodities, and therefore none that is more likely to continue and to extend. The port of Hull has also a considerable portion of the great emigrant trade of the present age, in which the steamers and shipping of England are used extensively to enable the emigrants of the European continent, to reach their ultimate places of settlement in America and Australia. This is entirely a new trade, which owes its existence, and its present direction, to the great superiority of British ships and steamers. These are rapidly becoming the chief means of transport and communication with every part of the world.

For the county of York and also some of the adjoining counties, Leeds and Hull are the chief markets for those important articles of farm consumption, rape-seed and linseed cake; and the increased demand for those articles, with the benefit derived from their consumption, are among the advantages which agriculture and commerce exchange with each other. The import of linseed into Hull from foreign parts, in 1848, was 337,361 quarters, and in 1860 529,500 quarters, showing an increase of 192,539 quarters in twelve years; and that increase still continues. The annual imports of rapeseed have advanced in the same proportion. The linseed cakes are consumed at home. The rape cake is partly employed for feeding cattle; but by far the greater quantity is used as manure, being broken up to about the size of a nut, and strewn on the land prepared for wheat. It is chiefly used in the neighbourhoods of York, Tadcaster, Wetherby, Pontefract, and Doncaster, or the fine agricultural districts of Nottingham and Lincolnshire.

The Sea Fisheries on the Yorkshire Coast.—The port of Hull owes part of its prosperity to the sea fisheries on the eastern coast of Yorkshire. It appears from recent inquiries into this important source of national wealth, that the shallow sea, known as the German Ocean, abounds with fish of various kinds. The general depth of that sea is not more than from ninety to one hundred feet, and considerable portions of it are occupied by banks, which are always being increased by the deposits from the numerous large rivers of England and the Continent. These banks cover an area equal to that of Ireland, and to them the sea fish of many kinds resort as their feeding grounds.

During the last twenty or thirty years the take of fish on the Yorkshire coast has been greatly increased by the building of much

larger fishing vessels in the port of Hull and other places, by supplying them with very superior means of catching fish, and by the great facilities which the introduction of steamers and of railways has given for conveying any quantity of fresh fish, in excellent condition, to all parts of the kingdom. The Hull fishing vessels, of which there are from 300 to 400 known as trawling vessels, of the value of about £300,000, are now of about eighty tons measurement, which is twice as large as they were built formerly. The nets are also much larger, and are rendered more perfect instruments for catching fish by the use of enlarged trawl beams. The nets are seventy feet long, and more than forty feet wide at the mouth; and they gradually diminish to a narrow passage about ten feet in length at the end of the net, into which the fish swim, and from which it is nearly impossible for them to escape. The trawl beam used at Hull for the deep-sea fishery was formerly thirty-six to thirty-eight feet in length, but is now made forty-two feet or upwards, and the head irons are heavier than they used to be. The mouth of the net is kept open by this beam, and the whole apparatus is so arranged that the net is towed slowly along, with the mouth and beam in front. The trawling beam is raised about three feet from the ground by the trawl irons, and never touches the bottom of the sea, except in case of accident. The smoother the ground, the more easily both the nets and the trawl work; and the sandy bottoms which usually prevail in these seas render trawl-fishing, and indeed fishing of all kinds, much more certain. A sandy bottom is much preferred, not only because it is the usual resort of soles and other valuable kinds of ground fish, but from the smaller danger that there is on such ground of tearing the net to pieces. The number of trawling vessels in existence around the coasts of England in the year 1865, when the last inquiry was made as to the sea fisheries of the United Kingdom, was nearly 1000, of which about 300 belonged to the port of Hull. Their value at that time was estimated at £1,000,000 sterling. At the same time the whole number of fishing boats of all sizes employed in the fisheries of England was 9300, worked by 37,416 men, and 5530 boys. The commissioners who made the inquiry of 1865 state that the trawlers are fine sea-going craft, smack-rigged, and able to stand almost any amount of rough weather. This, in fact, is one of the best schools of seamanship in the world. In the North

Sea the trawling vessels stay out, as a rule, six weeks at a time, in all seasons of the year; though, in the very neighbourhood of the Yorkshire coast, those that are within a moderate distance of the land find it more convenient to run in more frequently. In the more distant fisheries the fish is collected daily, packed in ice, and conveyed to market by fast-sailing cutters. Codfish, ling, and haddock are taken by means of long lines, provided with nearly 5000 hooks; and as soon as they are taken they are put into a well formed by a part of the smack's hold, divided from the rest of the vessel by water-tight bulkheads. The well occupies the whole breadth of the vessel, and the sea-water has free access to it, through auger-holes bored in the sides and bottom of that part of the smack. The fish are thus kept alive and fresh until it is convenient to send them to market.

The fisheries of Hull increased very rapidly between the years 1852 and 1864, and no doubt continue to increase. The total amount of packages of fish, landed in the port of Hull in the year 1852, was only 8159, whilst in 1854 the number amounted to 143,773. Between the year 1856 and 1864, the quantity of fish forwarded into the interior from the principal seaports of the kingdom, by the principal railways in the kingdom, increased from about 11,714 tons to 122,381 tons. This is independent of a great local consumption, and of the trade in salt-herrings, of which no less than 3,372,000 barrels were cured in the year 1864.*

Flamborough Head and Filey Bay are also very extensive fishing stations, as well as Scarborough, Whitby, and many other places, of which we shall have to speak in our account of the North Riding. When the commissioners on the deep-sea fisheries visited Filey in 1863, they found that there were forty-seven large and thirty small boats engaged in fishing. The number of fishermen was 400 to 500. The kinds of fish caught on this coast are cod, ling, haddock, skate, halibut, turbot, soles, plaice, thornback, and herring, and also crabs and lobsters. The same kinds of fish are caught off Flamborough Head, and in part supply the markets of Manchester, Leeds, London, Liverpool, Leicester, Nottingham, Birmingham, Northampton, and various other places. Trawling is also carried on extensively by the Bridlington fishermen. On one part of the coast to which the Flamborough fishermen give the name of "California," the

* Report of the Commissioners appointed to inquire into the Sea-fisheries of the United Kingdom, presented to both Houses of Parliament, 1866.

fishing was so rich that a single fisherman often got 100 stone of good fish a day, weighing from twelve to fourteen pound each.

Value and Increase of Property in the East Riding of Yorkshire, from 1860 to 1870.—We have shown in the preceding chapter the amount of property and profits of trade in the West Riding in the years 1860 and 1869, and how great and rapid an increase had taken place between those two periods, according to the official returns. The property and income of the East Riding is derived from fewer sources than those which contribute to swell the wealth of the West Riding. The chief sources of the wealth of the East Riding are its admirable agriculture, which may be regarded as the greatest of all its sources of wealth; the large and increasing commerce of the Humber, and more especially of the port of Hull, which is only surpassed by that of London and Liverpool; and the numerous watering places, and valuable sea fisheries, on the shores and in the waters of the German Ocean. It has no coal except what it derives from the West Riding and more distant districts, and has therefore few textile manufactures, and few manufactures of any kind, except such as are connected with shipbuilding, commerce, and the fisheries. But these sources of wealth and employment are very large, and there has been a rapid increase of wealth during the last ten years in the East Riding also.

Annual value of Property in the East Riding of Yorkshire.—The annual value of the property of the East Riding assessed under the property and Income Tax Acts for the three great schedules, A, B, and D, for the year ended the 5th day of April, 1860, was as follows, in the several collecting divisions of that Riding. Under Schedule A was included a return of the value of lands, mesuages, tithes, manors, fines, quarries, mines, ironworks, fisheries, canals, railways, gasworks, and all other property and profits not comprised in other schedules. Under Schedule B was included farming profits; and under Schedule D the profits derived from trade and commerce.

	Total Gross.	Gross.	Net.
	Annual Value of Property Assessed under Schedule A.	Annual Value of Property Assessed under Schedule B.	Amount of Profits Charged under Schedule D.
	£	£	£
Bainton Beacon,	89,963	74,186	24,313
Buckrose,	122,621	113,694	5,605
Dickering,	163,067	130,705	23,305

ANNUAL VALUE OF PROPERTY IN THE EAST RIDING—(Continued).

	Total Gross.	Gross.	Net.
	Annual Value of Property Assessed under Schedule A.	Annual Value of Property Assessed under Schedule B.	Amount of Profits Charged under Schedule D.
	£	£	£
Holderness, Middle,	132,021	82,035	34,310
Holderness, North,	87,362	76,593	4,084
Holderness, South,	94,332	85,041	5,176
Holme Beacon,	76,778	67,684	5,622
Howdenshire,	59,963	49,530	12,367
Hunsley Beacon, North,	88,589	59,815	41,865
Hunsley Beacon, South,	178,791	70,062	100,488
Kingston-upon-Hull,	261,132	21,698	413,301
Ouse and Derwent,	86,662	72,871	5,145
Wilton Beacon,	69,072	59,522	4,317
York, Ainsty,	91,410	77,893	7,453
York, City,	600,841	5,328	211,860
Total,	2,202,604	1,066,657	899,211

TOTAL PROPERTY RETURNED IN THE EAST RIDING IN THE YEAR 1860.

Property returned under Schedule A,	£2,202,604
Property returned under Schedule B,	1,066,657
Property returned under Schedule D,	899,211

Total, 4,168,472

Increase of Property in the East Riding from 1860 to 1869.—The following table will show the amount of increase of property and profits in each of the collecting districts of the East Riding during the same period, as well as the increase in the whole of that Riding.

Divisions.	Gross Annual Value of Property Assessed under Schedule A.	Gross Annual Value of Property Assessed under Schedule B.	Net Amount of Profits Charged to Duty under Schedule D.
	£	£	£
Bainton Beacon,	148,543	120,501	33,148
Buckrose,	122,951	107,299	6,515
Dickering,	158,446	117,424	26,649
Holderness, Middle,	164,720	93,325	42,985
Holderness, North,	76,999	64,176	4,374
Holderness, South,	102,265	89,948	5,409
Holme Beacon,	70,454	61,616	5,867
Howdenshire,	78,143	65,968	11,327
Hunsley Beacon, North,	117,497	81,505	60,577
Hunsley Beacon, South,	218,427	78,365	176,638
Kingston-upon-Hull,	382,484	31,265	816,275
Ouse and Derwent,	98,874	80,666	5,605
Wilton Beacon,	112,016	98,636	7,728
York Ainsty,	95,270	84,465	7,043
York City,	148,029	5,289	2,264,742
Totals,	2,095,118	1,180,348	3,474,882

* It is to be observed, that, under the provision of the Act 29 Vict. c. 26, the Profits of Railways, Mines, Ironworks, &c., were, in the year 1866–67, transferred from Schedule A to Schedule D.

 TOTAL PROPERTY RETURNED IN EAST RIDING IN THE YEAR 1868-69.

Property returned under Schedule A,	£2,095,118
Property returned under Schedule B,	1,180,348
Property returned under Schedule D,	3,474,882
Total,	<u>6,750,348</u>

INCREASE OF PROPERTY IN EAST RIDING.

Property in 1868-69,	£6,750,348
Property in 1860,	4,168,472
Increase,	<u>2,581,876</u>

CHAPTER III.

GENERAL DESCRIPTION OF THE COUNTY OF YORK.

Natural Resources and Products of the North Riding of Yorkshire.—The North Riding of Yorkshire extends from the mountain range forming the western boundary of the North and of the West Ridings, to the German Ocean, which forms the eastern limit both of the North and of the East Ridings. It includes most of the geological formations and many of the soils that are found in the West and the East Ridings; but with the very important exceptions of not possessing a coal-field, like that of the West Riding, chalk downs, like those of the East Riding, or alluvial and diluvial lands, such as those which exist in both those Ridings. With these exceptions the North Riding has nearly all the soils that are to be found in either of the other two Ridings.

Taking the strata and the unstratified formations in the order usually given to them, and beginning with the lowest, the North Riding has a basaltic dyke, running from the sea at Robin Hood Bay, in a north-westerly direction, to beyond the river Tees. With this exception, all the rocks of the North Riding are stratified. It also possesses, on its western side, the carboniferous rocks of the upper limestone shale, or Yoredale series; the millstone grit, intermixed with and overlying the mountain limestone; a small portion of the magnesian limestone, and a considerable development of the new red sandstone. To the east and north of the last-named formation the Lias of Cleveland, rich in ironstone, first appears. Still further to the east are all the principal rocks of the oolitic series, which emerge from the sea on the Scarborough coast, between Robin Hood Bay and Filey Bay. None of the formations of a more recent date than the new red sandstone exist in England to the north of the county of York; and their presence has a great influence both on the agriculture and on the mineral wealth of the North Riding.

The climate of the North Riding varies greatly in proceeding from its western to its eastern limit. Amongst the mountains

on the western boundary, the rainfall is much above that of the average of England; whilst in the eastern part of the Riding it is below the average of the kingdom. This circumstance has great influence on the agriculture of the district.

The North Riding of Yorkshire, with this great variety of soil and climate, presents many differences in the modes of cultivation; and there are few parts of England in which the details of farming are more modified by the climate and the geological character of the strata on which the soil rests.* To the extreme west of the Riding, the valleys and hill sides of the mountain limestone present grass land so valuable, as to let for as much as four pounds per acre in that isolated district. Proceeding eastward, there is an ungenial belt of the millstone grit and limestone shale. Next, a broad belt of the new red sandstone, with a light intervention of the magnesian limestone; then another belt of the Lias, curving over to the north-east; and last, a similar and almost parallel belt of the Oolite. The whole may be described as a series of wavy stripes, in some cases broader, in some narrower, but much modified by aspect and situation. The soil divides itself, with these modifications, much in the same manner. Thus, the new red sandstone presents the "turnip and barley soil," almost precisely co-extensive with the stratum on which it rests; and there one systematic and uniform management prevails, unpractised only from want of skill, or, far more generally, from want of capital. The Lias, co-extensive with the district called Cleveland, but still bending away at the foot of the Hambleton Hills—is cold and heavy, and designated "two crop and fallow land:" and the Oolite presents a finer arable soil on the lower lands, but rises into mountain pastures in the centre of the district.

The Dales of the North Riding.—At the extreme west and north of this Riding are the beautiful valleys and the mountain limestone districts of Wensleydale, Swaledale, and Bishopdale—the hills between which are wide expanses of bleak, barren moorland, lying too high for cultivation. These valleys have a climate which is too cold to admit of the cultivation of much grain; and the land is so profitable in grass that there is little inducement to withdraw it from that mode of production. The valleys of the Ure and the Swale appear to have been formed or greatly deepened by those

* Prize Report on the Farming of the North Riding of Yorkshire, by M. M. Milburn.—Journal of the Royal Agricultural Society of England, vol. ix. p. 496.

streams, which have their source at the extreme north-west of the Riding; and as the limestone is abraded, and carried by the rills down to the bottom of the valleys, this deep accumulation presents a soil richer, perhaps, than in any other part of the county, though less valuable than some, in consequence of its being far removed from the traffic and population of the West Riding. Nearer the hill tops the rock is more lightly covered with soil and the grass of a poorer quality, but it is, nevertheless, very valuable in producing cheese. On the lower and more productive portions cattle are grazed and fed for the markets of the West Riding of Yorkshire and Lancashire; pigs are fed on the milk after the cheese has been made: and thus the exports are fat cattle, sheep grazed on the steeper uplands, bacon, lard, and cheese, richer, perhaps, than even the Derbyshire or Cheshire, but destitute of the peculiar flavour of the latter, and milder generally than the former. The calves are partly reared in the valleys, and partly sold off; and the cattle are purchased at the Falkirk and other trysts of the north. It is no uncommon thing for one beast to be fattened on an acre of land. The main duties of the dairy devolve upon the females of the house; and as there are no green crops, and no corn, the cattle have to depend through a long winter, usually severe, upon the hay crop exclusively; hence, the hay-time is the busiest season of the year, and a more critical time, in this rainy climate, it is hardly possible to conceive.

In Mr. William Wright's Prize Report on the Agriculture of Yorkshire, he gives a very favourable account of the recent progress of agriculture in this beautiful part of the North Riding. He observes that—"Of the high lands in the North Riding it may be said, that more improvements have taken place here, since the report given by Mr. Milburn in the year 1848, than in any other part. Nearly all the draining there required has now been done effectually, either by the landlord and tenant jointly—the one finding the materials, and the other the labour; or by Government loans, the tenant carting all the materials, and paying seven per cent. on the money expended. These improvements have been made at a cost which cannot be estimated with accuracy; but three-fourths of the outlay has been expended by the tenant. We must, however, mention that tenants have not always had the benefit of a landlord's assistance in carrying out their improvements. When draining has been done with Government money they have carted

all the materials, stubbed up old fences, planted new ones, filled up ditches, and made new roads, at a considerable cost. In some districts more improvement has taken place during the last few years than during the previous half century, by manuring more heavily, by cropping more frequently, by economizing horse and manual labour, and by means of improved implements ; yet the ungenial belt of millstone grit and limestone shale is still a barrier to profitable or extensive cultivation, although the beds of ironstone lately discovered give a value to the Cleveland hills which was little anticipated."

The Millstone Grit.—Mixed up with the rich limestone soils of the North Riding, and generally forming the highest hills of the district, is an extensive development of the millstone grit. The hills of this formation usually run in long lines, from the western boundary of the North Riding to the edge of the vale of York, terminating eastward near Ripon, Masham, and Richmond. These hills are usually covered with heath, and not with grass ; are very thinly populated and scarcely at all cultivated. Their general appearance is wild and romantic, but their products, whether vegetable or mineral, are of little value, except about the above-named towns, where a good soil has accumulated along the banks of the rivers.

The Magnesian Limestone.—The magnesian limestone is slightly developed in the North Riding, along the eastern edge of the carboniferous rocks, in the neighbourhood of Bedale, Middleton Tyas, and the banks of the river Tees. It does not form a continuous line as in the West Riding, but breaks off in the neighbourhood of Bedale, appears in patches near Catterick Bridge and Middleton Tyas, and is again developed in a continuous line at a short distance south of the river Tees, whence it extends northward in a broader line to the sea at Hartlepool, and along the sea-coast to the mouth of the Tyne. Its general characteristics are much the same as in the West Riding. It supplies lime and building stone, and the soil is very favourable to cultivation.

The New Red Sandstone.—The new red sandstone is much more fully developed, and is seen in the North Riding chiefly in the form of a wide valley or plain, generally covered with the richest grass, and extending from the carboniferous formations of the West, to the Lias plains or the Oolitic hills of the East.

The system of cultivation adopted on the new red sandstone

formation, when it is not allowed to lie in grass, is the four-course system, already described in the account given in this work of the cultivation of the same formation in the West and the East Ridings. There is much excellent land on the new red sandstone plain in the North Riding, and the cultivation is generally very good.

To the east of the new red sandstone plain is a comparatively narrow breadth of the Lias formation, extending from Redcar inland to the neighbourhood of Thirsk, and from Thirsk to the neighbourhood of Sheriff-Hutton.

The Lias Formation.—The Lias formation succeeds conformably to the new red sandstone. It commences at its northern extremity on the coast of Yorkshire, and runs with a south-eastern course, from that point through the rest of England, to Lyme Regis on the Dorsetshire coast. It consists of beds of clay, shale, and limestone, with extensive deposits of iron ore, and occasionally layers of jet. Its escarpments generally face west and north-west. The marlstone is the most prominent of these, and overlooks the broad meadows of lower Lias clay that form much of the plain of York, and indeed of central England.*

The Oolitic Formation.—Conformable to, and resting upon the Lias, are the various members of the Oolitic series. That portion termed the inferior Oolite occupies the base, being succeeded by the great or Bath Oolite, cornbrash, Oxford clay, coral rag, Kimmeridge clay, and Portland beds. These and the underlying formations, down to the base of the new red sandstone, constitute what geologists term the older secondary formations, which generally extend from the north of Yorkshire to Dorsetshire.†

The following is Mr. Milburn's account of the cultivation of the Lias and Oolitic districts, in which a mixed system of husbandry prevails.—“We have now the difficulty of describing the farming of a variety of soils, altitudes, and situations, scattered over the moorlands of the Oolite series, and the valleys traversing them, some, in a degree greater or lesser, covered with diluvium of a mixed character, and each division or subdivision being modified so as to present no great distinctive outline. In general, we may say that the Oolite of the east, and the magnesian limestone of the south-west, are under the four-course or convertible system, with more or less modification; the valleys of the Lias partake of the strong Cleveland soil, while the vale of the Derwent from its source, and the

* A. C. Ramsay, *Physical Geography and Geology of Great Britain*, p. 62.

† A. C. Ramsay, p. 63.

vales of the Rye and the Esk, are more or less of a peaty character, and grow hardly any grain but oats, while the great elevation of the eastern moorlands leaves their valleys of the same character.

"The general course pursued is, 1, turnips; 2, oats; 3, 4, seeds (kept two years in pasture); 5, oats. Some of these regions are much exposed, and the wildness of the climate above, and the nearness of the water below, render, in some years, the securing of the crops very difficult. The eastern moorlands lie at a considerable height above the level of the sea: Black Hambleton, 1246 feet; Brotton Head, near Stokesley, 1485; Roseberry Topping, 1022; and the quantity of uncultivated hills and moors rising from 1000 to 2000 feet is said to amount to some 400,000 acres. The turnips are chiefly consumed by sheep on the land, and the seeds are often eaten by ewes from the lowlands, in summer when the lambs are taken from them. The coolness and pasturage are favourable to sheep, and they usually return in September or October in very excellent condition.

"Mr. Mauleverer showed a specimen of what might be done in rendering productive even this moorland district, with all the disadvantages of soil and climate, in his little model 'Ladye Chapel Farm,' where the sheep are being fed on what used to be the haunt of the wild mouse and the mole; and the luxuriant oats are waving before the wind, that used to whistle through the whins and the heather. There are many spots, however, where science and skill have rendered various portions of this miscellaneous district, near Kirby Moorside and Helmsley, highly productive. The estates of Earl Feversham are well cultivated, on a strict alternate rotation, which, if it has a fault, is in adhering somewhat pertinaciously to the sowing of clover, and to one uniform adherence to the Norfolk system. In the lowland portion, embracing the south-eastern part of the Riding, there are not a few instances of excellent farming on the farms about Brandsby and Sheriff-Hutton; Colonel Croft, of Stillington, and many of the superior farmers, set a noble example of thorough draining, high cultivation, large and weedless crops, and great numbers of excellent sheep, their farming verging on the well-understood and well-acknowledged system of 'crop green and crop gray.'"

Draining in the North Riding.—Speaking of the practice of draining in the North Riding, Mr. William Wright states, in his Report on the Farming of Yorkshire, that no district offers greater advan-

tage for deep drainage than the vale of Cleveland, where the work has been carried on with great vigour for several years. Previously nearly the whole district was farmed under the old ridge and furrow system, with water grips and open ditches; no crop was ever expected to grow in the furrow, and the consequent deficiency in the yield was very considerable. Draining the furrows and filling up the ditches increased the breadth of available soil, besides greatly improving the quality of the grain. Another result of this improvement has been an increased growth of roots, whilst a gradual amelioration of the stronger lands was effected, which will enable the farmer to adopt other improvements practised in those districts that have been longer under the influence of effective drainage. Mr. Wright states, that six per cent. is charged by many landlords on the cost of drainage in the North Riding.

One great difficulty with regard to draining, both in the North and the East Riding, is the want of good outfalls. Some works have been commenced on the river Rye, and on the river Derwent, which receives the waters of the Rye, and of most of the rivers of the North Riding; but they require to be much extended to render them effectual. The Derwent, which is almost the only outlet for the floods of the East and of part of the North Riding, is tortuous; and its outlet is so bad, that the immense body of water which it gathers in its course floods a vast area of land, for miles in extent, and for weeks together. The only outlet of the waters of the North Riding is through the Pass in which Malton stands; and the only outlet for the accumulated waters of the North and East Ridings is through the mouth of the Derwent. Mr. Wright states, that the waters of this large district should be made to fall more directly into the Ouse and the Humber, which might be made amongst the finest outfalls in England. He speaks more particularly of Howden-shire in the East Riding, which includes a circuit of fifty miles. But there are other defects in the course of this great natural outlet, which might be amended with great advantage to both the Ridings.

Cattle, Horses, and Sheep of the North Riding.—Mr. Milburn gives the following account of the cattle, horses, and sheep of the North Riding:—"The 'Yorkshire cow,' so celebrated, and more prized when milking and dairy qualities were more esteemed and more admired than early maturity or disposition to feed, is losing caste. As the dairies and grass began to disappear, the distinctive breed has given way, and the celebrated breed of the

banks of the Tees, the short-horns, is spreading with more or less purity, and a greater or lesser degree of alloy—spread by the excellent landlords, who, patronize breeding by purchasing the stock of the first and most judicious breeders, and allowing their tenants the free use of those superior animals. Hence the short-horns have spread so far that it is no unusual thing to find animals of twelve to eighteen months old sold fat to the butcher. To enumerate the breeders of the North Riding were therefore to name the greater part of the landed gentry and aristocracy; but even the professional breeders are numerous, and stand so high that it were invidious to name a few of them."

On the subject of Yorkshire cattle Mr. Wright observes, that the short-horn is now almost the only breed of cattle which is much esteemed in Yorkshire. He also mentions that between the years 1848 and 1859 inclusive, Yorkshire breeders, or cattle bred in the county of York, took twenty first class and twenty-five second class prizes in six classes of cattle, shown in twelve exhibitions of the Royal Society of England. With regard to short-horns Mr. Wright says, that the most eminent breeders reside in this county. It is no uncommon thing for a leading breeder to receive 200 guineas a year for the use of a single animal; and there is such a competition for bulls that many of the highest personages in the land are glad to enter their names on the list, for a supply when their turn comes. The breeders of the highest class of animals justly merit the reputation they have acquired; for it is not without much care and expense that the animals have been brought to such perfection. When one is calved of the right colour, free from blemish and of good pedigree, no expense is spared in the rearing. It is fed on new milk twice or thrice a day, and in ample quantity. Cream is even said to be sometimes added. A lump of chalk is left in the crib to prevent acidity; plenty of the best hay, ground oats, beans or malt, and linseed cake are given as soon as possible, so as to insure rapid growth, and the development of those points of excellence which alone bring success to the careful breeder.

The Horses of Yorkshire.—Yorkshire and especially the North and East Ridings, and a portion of the West, have been famous for their horses for more than three hundred years. The race-horses which are bred and trained in the neighbourhood of Malton, Beverley, Doncaster, Middleham, and in many parts of the North Riding, stand in the first rank for swiftness and powers of endur-

ance. The hunters of this district are also extremely fine. Some of them are well made, with good bone and sinew, well up to twelve to thirteen stone, and able to keep up in a good run; and the fortunate owner may demand from 200 to 300 guineas for such an animal. Mr. Wright says, that they surpass the hunters of former days, being more enduring throughout a hard day, carry heavier weights, come home fresher than formerly, recover themselves sooner, and are superior in every respect to their predecessors in the hunting field of twenty years ago. In the lighter breed there is no great difference. The old-fashioned strong and heavy riding horse is not so much required as formerly, but when perfect is still very valuable. The genuine cob which can trot fast and safely, was never in better demand than now, nor realized higher prices. Carriage horses are of a lighter make than formerly, the old family coach having given way to the lighter brougham, and the old Cleveland bay to a lighter animal. The hunter class is now required for harness, and demands the same attention in the choice of the size as the true hunter. The cross between the Cleveland bay and the small compact thoroughbred keeps up its reputation, and brings high prices, ranging from 100 to 200 guineas. They are most prized when about or under sixteen hands, with light step and quick high action. The North Riding, Howdenshire, and Holderness, are the chief breeding grounds for hunting and carriage horses. The principal horse fairs, namely, Howden, Boroughbridge, North Allerton, York, and Beverley, continue to maintain their reputation for excellent horses, and have of late years been much resorted to by foreign dealers, who give large sums for first-rate animals.

"Sheep.—Few better specimens of excellent sheep exist than in this Riding. The long-wooled, or improved Leicester, are the general favourites; and bone, wool, and mutton seem to be rather the desiderata, than mutton alone. The favourite sheep on the turnip soils is that which weighs, when fat, some twenty-eight or thirty pounds per quarter, and nearly the whole are fed in winter on turnips, and kept until they are two years' old; some attempts at selling them at thirteen and fourteen months old have been made, and in some cases with profit to the owners, but the system is far from being general.

"Some farmers graze and winter the Northumberland sheep, and sell them early; but so fatal has been the epidemic of late years on all travelling animals, and the injury inflicted on the

farmers by introducing disease, that the practice seems to be losing ground.

"Pigs.—The long-eared and large breed are rapidly falling into disuse ; they are still preferred in the Dales, where they are kept long on hand ; but the small breed are chiefly in favour, and are found to be on the whole the most profitable, being easily fed, and producing a greater return for the food given."

The Recent Improvements of Farming in Yorkshire.—We are indebted to Mr. William Wright for the following general summary of the recent progress of farming in Yorkshire. He observes, that to assert that the improvements made by the landlords of Yorkshire have in all respects kept pace with the requirements of the present day, would be a bold assertion. But those who have performed their duty in the widest sense of the word are far too numerous to particularize ; and were a just tribute paid to their worth, we should exceed the limits prescribed. Suffice it to say, Yorkshire is proud of her landlords, and their tenants respond to their efforts.

On many farms an outlay of £4 to £5 per acre has been made on new buildings, erected on plans combining comfort, convenience, and healthiness ; a similar amount on drainage, and a considerable sum in making roads, enlarging the fields, filling up ditches, and planting new hedgerows—amounting to a total of £12 an acre thus added to the wealth of the country, and enabling the tenant to produce a yearly increased supply for the wants of the community. In carrying out these improvements, it is usually required of the tenant that he should pay an annual interest, or increase of rent equivalent to five per cent., on the sum expended—an understanding mutually beneficial.

The landlords' attention has also been directed to the manufacture of tile and pipe machinery ; to their efforts we chiefly owe the valuable and superior machines now in use. In order to obtain a good supply, many landlords have been compelled by their distance from the tile-yards, or the inferior quality of the goods there sold, to establish works for themselves ; and thus a better article is substituted for the partially-burnt and ill-made tile of former days.

Within the limits of the period to which this notice extends is to be dated the perfecting of implements for digging the arterial and parallel drains, and the reduction of expense of draining to the minimum consistent with good workmanship.

Mr. Wright observes, "that, in some parts of the county, considerable care has been bestowed in erecting buildings with regard to effect. We hail this commencement with pleasure, and doubt not but that shortly architecture, in the proper sense, will fully assert her claims, and picturesque beauty be combined with utility. The good feeling which exists between the improving landlord and his intelligent tenant, springing mainly from a just estimate of their mutual interests, has prompted the former to co-operate with his tenant in the purchase of guano, and in the introduction of improved stock, implements, seeds, fencing, &c., thus enabling him to have a supply of the best materials to aid his efforts. On some farms, held by the landlords in their own hands, much service is thus rendered to the surrounding tenantry, of which we might cite instances that strongly tempt us to depart from our determination to speak of improving landlords only as a class, rather than do but partial justice by selecting individual cases. Much alteration has been bestowed of late on the improvement of cottages, an object which the prizes for the best plans lately awarded by the Yorkshire Society will do much to promote.

"In the demand for timber and wood, which the landlord reserves to himself, there have been important variations. The great increase in the consumption of iron for shipbuilding, by diminishing the use of wood, has caused a considerable fall in the prices of English oak within the last fifteen or twenty years. The reduction in the duties on foreign timber and deals has diminished the demand for some kinds of English woods. On the other hand, our expanding energies have opened out new sources of demand from our mines, factories, buildings, and agricultural implements, &c.; and prevented that general decline in prices, which was anticipated on the removal of the timber duties. Many landlords make more money per acre by growing wood, than by letting land in farms. Fewer ash and more elm are now planted; but a rise to the value of fifty per cent. has taken place in osiers for basket-makers; and a great demand exists in the West Riding for coal-pit wood, for props, baskets, &c."

Mr. Pusey, in his admirable paper on the Progress of Agricultural Knowledge, during the eight years from 1842 to 1850, sums up the improvements demanded at the hands of the landlords, under the twelve following heads, all of them applicable to Yorkshire (*Agricultural Journal*, vol. xi. page 381):—

1. Drainage—(1) Trunk drainage—(2) Under-draining.
2. The removal of useless fences—(1) Fences—(2) Trees.
3. Diminution of four-footed game.
4. Burnt clay—(1) Border burning—(2) Clod burning.
5. Marling or claying—(1) Sands—(2) Peat.
6. Lime ; burning grass-lands.
7. Boning pastures.
8. Chalking.
9. Irrigation or catch meadows—(1)—Hill side—(2) Flat—(3) Flood.
10. Breaking up grass-land.
11. Improvement of farm buildings.
12. Warping.

The list is at first sight sufficient to appal any man whose pocket is not inexhaustible ; but examination proves them all to be valuable, if not indispensable to the development of agriculture. Have the Yorkshire landlords responded to these requisitions? We fear to press the inquiry. If we except Nos. 4, 9, and perhaps 10, of these twelve heads, an estate is not perfect unless the other requisitions are complied with. On the hills, liming, chalking, and marling ; on the lowlands, draining, removing fences and trees, diminishing game, claying sand and peat ; warping where practicable ; liming and boning grass-land—are required. Mr. Pusey justly and considerably says, “these are the improvements which it is in the landlords’ power to effect ; in other words, we place the standard before you ; we invite you to examine it and to follow it on your own estates, for the full development of the resources of the land.”

Yorkshire, having a moister climate than many of the southern counties, derives the greatest benefit from covered yards for cattle, which are equally applicable to high and low districts, combine shelter with warmth, preserve those elements in the manure which are apt to be lost when exposed, and are invaluable for the economical feeding of cattle and horses. Mr. Wright observes, “We did not venture to urge this on the attention of landlords and tenants before we had fully tried the effect, and, having satisfied ourselves of the advantage of the shed system, we recommend it with confidence ; it is as superior to box-feeding, as that was to the old-fashioned cattle-house. The manure is always excellent in quality, ready for use at any time ; nothing is lost, no liquid-manure tanks are wanted. Our shed has repaid its cost once, if not twice, and on no consideration would we return to the old-fashioned system of open yards. When new buildings are wanted, the covered yard is not more costly than the old-fashioned open range of buildings, and excellent materials in iron or timber can be procured at a moderate outlay.

"No more acceptable or convincing proof of the improvement in agriculture can be given, than the fact of the increased value of land—an increase, not fluctuating with the price of grain, but permanent and steady. When an estate is in the market, which occurs but seldom, the land makes, at a moderate computation, fully ten per cent. more than it would have brought twelve years ago. The improvements effected by the landlords naturally command a high rental. This state of things must be satisfactory, and has fulfilled the anticipation expressed by an able writer, in a time of the greatest depression; 'That the hereditary owners of land would, by the continued exertion of that energy and prudence which carried those from whom they inherit their possessions through all changes, continue to maintain their social position.'—(Gisborne's "Essay on Agriculture," p. 255).

"The list of non-improving landlords is happily small in this county; but as long as any remain, these observations would be incomplete if they were not briefly brought under notice. On the estates of such owners are found the ancient hedge rows existing in wild luxuriance; ponds, often occupying large spaces, sometimes in small inclosures of not more than six or seven acres; headlands unploughed; roads and drainage neglected, or, if attempted, done very inefficiently; farm buildings small and ill-contrived, and the farm house, of one story high, with a sledge or pitch roof, small and incommodious; the tenantry low-rented, but poor and spiritless, exhausting still more the already impoverished soil, neither benefiting themselves nor the community at large. Such a picture is neither imaginary nor overdrawn; we could mention several large estates to which it accurately applies.

"The aim of the landlord should be to maintain his estate in an 'improving condition;' that is to say, the deposit of fertilizing elements in the soil should always be in excess of the aggregate of those abstracted in the marketable produce. The warning voice of Liebig urgently calls our attention to the maintenance of this progressive fertility. No county offers so many advantages as Yorkshire for a sufficient and permanent supply of solid manure, and nowhere can the efficacy and economy of sewage manure be more favourably tested than near such towns as Leeds, Sheffield, Bradford, Halifax, Huddersfield, York, and Hull. We trust that the present generation will find means to stay the vast waste of our sewage, as effectual as those already applied to the supply of gas and water."

The Value of Liquid Manure.—Mr. Wright observes that the

application of liquid manure, brought in large quantities and from a great distance, is not a tenant's but a landlord's question. "A tenant cannot be expected to take up a scheme of such magnitude, though he might and would essentially aid its working. With regard to the expense, let us instance the cost of supplying with fertilizers a well cultivated farm of 200 acres of ordinary land. To keep up a regular supply of manure, such a farm requires ten tons of linseed cake, or in lieu thereof an equivalent in corn; also in artificial manures, either ammoniacal or phosphoric, a further average annual outlay of £80, which will make a yearly cost of £200, or £1 per acre. Such an estimate is not a high one for manure only; lime, &c., not being included. We propose to replace this outlay by offering 20s. per acre, for a jet of 'sewage supply,' and we think the experiment would be a boon to the farmer, and present to the contractor an ample profit on the outlay for interest and working expenses. Charnock gives some pertinent remarks on this subject. He mentions (*Journal*, vol. ix. p. 309.) a case of land growing wheat in succession many years, and producing thirty-nine and forty-two imperial bushels per acre. He says, 'now this land adjoins the river Calder, the floods from which have proved a sufficient manuring to maintain its full fertility, and yet grow successive crops of wheat year after year; and this field is by no means a solitary instance of the richness of this, and many other of the West Riding valleys, that are watered by its rivers.'"

Mr. Wright gives the following particulars as to his own experiments with liquid manure:—"We have during the last ten years collected reliable data of the money value of sewages; and we will give our experience in the hope of stimulating the interested parties, landlords in particular, to commence operations in this county, which offers such peculiar facilities. We commenced operations at Sigglesthorne by building underground two cisterns, each capable of holding from 3000 to 4000 gallons; they were made watertight. Into one of these the contents of two water closets are collected, into another a third water closet, and all the slops of the house. The family averages fourteen persons, and, for the last ten years, the whole sewage of the house has been carefully preserved and applied—first, to a flower garden of three acres, a moderate-sized vinery, shrubbery, and kitchen garden, and the remainder put on a grass field of about seven acres, which from an almost barren waste has become

so fertile that we have ceased to irrigate it, and are now dressing another field. No solid dung, such as stable or foldyard manure, has been applied to the vinery for the last ten years, yet the vines have produced an abundance of fruit, and in the greatest perfection; and, with regard to fruit, the strawberries are more than usually prolific. Two common lift pumps are fixed to the cisterns; the liquid is pumped by hand, and wheeled away in a barrel suspended on a convenient barrow. When applied to the grass-land, one of Crosskill's liquid manure distributors is used. We estimate its yearly value on our farm and garden at thirty tons of good dung, £12. The facility with which liquids are now dealt with is shown in the Report on the Drainage of Whittlesea Mere by Wells (*Journal of Agriculture*, vol. xxi. p. 134). Such a scheme, which involves the lifting of 6000 gallons of water six feet a minute, could only have been carried out by the use of steam power; and many a town presents facilities for draining off its sewage, and conveying it to the surrounding land, which would render the task as easy as that of reclaiming the Mere. But where shall we find such spirited men as accomplished that task? England has stood foremost in other improvements of late years; let her lead the van in this great modern experiment."

The Produce of the Land in Yorkshire.—Although we have no official estimates of the quantity of grain, or any other article, yielded by the soil of Yorkshire, there is no doubt that the average is high in the finer districts of all the three Ridings, but low amongst the mountains and hills. This is inevitable with such great varieties of soil and climate. The following, however, is the estimate formed of the yield of the principal crops, by Mr. William Wright, in his recent Report on the Agriculture of Yorkshire. He says:—"On well drained and properly managed farms the produce of wheat varies from thirty-six to forty bushels per acre: in some instances a higher estimate may be taken; while twenty to twenty-four bushels is the yield on those less cultivated or ill-managed. The yield of oats is frequently eighty bushels, against thirty-five or forty on the old-fashioned system; and of barley, sixty bushels."

Agriculture of the North Riding, according to the Returns published in 1870.—The agriculture of the North Riding differs considerably from that either of the East or of the West, partly on account of the loftier and wilder character of the land, as compared with

that of the East Riding, and partly from the thinness of the population, as compared with that of the West. The North and the West Ridings are both included in the agricultural returns as amongst the grazing districts of England, whilst the East Riding is returned along with the corn-growing districts.

The North Riding is much larger in extent than the East Riding, but not so extensive as the West, covering an area of 1,350,121 statute acres.

About one-half of the whole acreage of the North Riding is under various kinds of crops, or bare fallow and grass. The land thus occupied amounted in 1868 to 786,825 acres, and in 1869 to 798,699. The quantity of permanent pasture or grass not broken up in rotation, in the North Riding, was 382,833 acres in 1868, and 397,846 in 1869. This was exclusive of the heath and mountain land, which is more extensive in the North Riding than it is in the East, owing to the much greater elevation and much wider extent of the mountains and hills, both in Cleveland and in Richmondshire.

After deducting this large quantity of pasture-land, seldom touched by the plough, there remained in 1868 under corn crops 225,064 acres, and in 1869, 230,082; under green crops 73,886 in 1868, and 79,353 in 1869; and under clover, sainfoin, and grasses under rotation 67,291 in 1868, and 56,960 in 1869. The various kinds of grain and corn grown in the North Riding, in the years 1868 and 1869, were as follows:—Wheat, 83,584 acres and 86,686 acres; barley or bere, 54,376 and 55,545; oats, 70,701 acres and 69,031; rye, 1578 acres and 1689; beans, 10,867 acres and 11,178; peas, 3958 acres and 5953; making the total under corn crops 225,064 in 1868, and 230,082 in 1869.

The quantity of green crops grown in the North Riding, in the years 1868 and 1869, was as follows:—Potatoes, 10,017 acres and 12,826; turnips and swedes, 57,364 acres and 57,984; mangold, 533 acres and 983; carrots, 74 acres and 99; cabbage, kohlrabi, and rape, 3248 acres and 3877; vetches, lucerne, and other green crops, except clover or grass, 2650 acres and 3584; making the total under green crops in the North Riding 73,886 acres in 1868, and 79,353 in 1869. The quantity of flax in the same two years was 1063 acres and 994; the extent of bare fallow or uncropped arable land was 36,688 acres and 33,458; the quantity of clover and sainfoin, and other grasses under rotation, was 67,291 acres and 56,960. In

addition to these crops, the permanent pasture, meadow, or grass not broken up in rotation, exclusive of heath or mountain land, as already mentioned, was 382,833 acres in 1868, and 397,846 acres in 1869. With so large a quantity of grass land, the North Riding abounds in cattle, horses, and sheep. The total number of cattle in 1868 was 148,256, and in 1869 146,190; the total quantity of sheep in 1868 was 744,744, and in 1869, 698,279. The number of horses in the North Riding was 41,991 in 1869, in the hands of occupiers of land only. The number of pigs was 52,058 in 1868, and 46,085 in 1869.

The farms of the North Riding, on the average, contain fifty-one acres each, against seventy-eight acres in the East Riding, thirty-seven acres in the West, and sixty acres in the whole of England. They are thus considerably less than the farms of the East Riding considerably larger than those in the West Riding, and rather less than English farms are in general.

Agricultural Labourers' Earnings in Yorkshire.—One of the most interesting questions connected with the agriculture of this county, as well as with all the other great branches of national industry, is what is the amount of remuneration, and of the means of domestic comfort which the cultivation of the soil supplies to the multitudes of families dependent upon it. The security and the happiness of all states, especially in an inquiring age like the present, depend chiefly on the condition of the labouring classes; and as that portion of the labouring population which is dependent on the cultivation of the soil is much greater than that which is dependent on any other branch of national industry, it is especially interesting to ascertain what is the condition of that class as to the amount of its earnings, which forms the measure of its share of the comforts of life.

Although it is somewhat difficult to form a correct average of the amount of wages paid to a population which is scattered over the whole of the three kingdoms, yet the attempt to obtain this information has been made by Parliament during the last and the present year; and though the returns are very imperfect as to their extent, they appear to be impartial, and to have been made on the spot, by disinterested persons. The few returns which have been made from the registration districts of Yorkshire may be regarded as very favourable, showing a general rate of farm wages as high as exists in any part of England, and sufficient to insure a fair amount of comfort in the cottages of the farm labourers of Yorkshire. Their

great defect is that they contain no particulars from the East Riding, which is the finest agricultural district of the county.

In the North Riding the returns are, from the Malton district, containing 112,407 acres and a population of 23,483 in 1561; the Leyburn district, containing 84,918 acres and 10,105 inhabitants in 1861; and the Richmond district, containing 78,569 acres and 13,457 inhabitants in 1861. The Malton district is a fine agricultural district, and may be taken as a specimen of the corn-growing districts of the North and East Riding, being situate in the former, but very near to the latter.

According to this return, the wages of men employed in farm labour in the Malton district, in the quarter ending Michaelmas 1869, were 19s. 9d. a week, without food, or 11s. 9d. with food; while those of women were 8s. a week, without food; and those of children under sixteen 5s., also without food. It is stated, however, in this return, that the average wages of men is greater in the quarter ending Michaelmas than at any other portion of the year, on account of the harvest and the turnip hoeing season. At other seasons of the year the average wages of men would be 15s. 6d., without food, or 8s. with food. The same observation applies to women and children, the wages of the former being 6s. a week at other seasons of the year, and those of children 3s. a week.

The Leyburn district is chiefly a grazing district, and does not afford much employment either for women or children, except in time of hay-making. In the Leyburn district wages are given at 15s. a week for men, without food; those of women at 6s., also without food; and it is stated that there are no wages for children under sixteen.

In the Richmond district, the wages of men are said to be 15s. to 18s. a week, without food, and the earnings by taskwork 18s. The wages of women are 6s. to 9s.; and those of children under sixteen, 3s. to 6s. It is added that the general average wages of men are 2s. 6d. per day, and that on some farms a pint of beer is allowed to each man during harvest. The general average wages of women are from 1s. to 1s. 6d. per day. The latter are harvest wages, and on some farms a gill of beer is allowed to each woman; wages of children from 6d. to 1s. per day.

In the West Riding there are returns from the Settle, Pateley Bridge, Doncaster, and Thorne districts. Settle is a grazing district, extending over 154,591 acres, and containing a population of 12,528 persons in 1861. It is stated that there the wages were 15s. to

18s. in the quarter ending Michaelmas, 1869; the day labourers generally earn from 15s. to 18s. a week, without food; whilst farm servants under a yearly hiring, with food and lodging, earn from 7s. to 10s. a week. The earnings of women, and of children under sixteen, are set down as "None."

In the Pateley Bridge district—extending over 67,828 acres, and containing a population of 9534 persons in 1861—the wages of men are returned at 15s., those of women at 7s., and those of children under sixteen at 5s.; and it is stated that weekly earnings by task-work are not known in that union.

In the Doncaster Union—which is a very fine agricultural district, extending over 109,031 acres, and containing 39,388 persons in 1861—it is stated that the average weekly wages in the quarter ending Michaelmas, 1869, were for men, 14s.; women, 6s.; children under sixteen, 6s. During four weeks in harvest the wages of men were from 20s. to 24s. per week, and those of both women and children from 12s. to 14s. per week.

In the fine agricultural district of Thorne, extending over 71,946 acres, and containing a population of 16,011 in 1861, the wages of men in the Michaelmas quarter are said to be 21s. per week, those of women 9s., and those of children under sixteen years, 7s. 6d. During harvest bread and cheese, or other food, with beer, are generally allowed in addition to the money earnings; but this allowance may be safely estimated at 1s. per head daily for both men and women. In the Thorne Union taskwork is rarely resorted to, except during harvest, when a labourer, with his wife and one child, will earn about £2 10s. per week, but without extra allowance for food or drink. If there be more than one child in the family capable of working, the earnings are proportionately increased.*

It is to be regretted that the information supplied by this return does not extend to a greater number of unions; but still it serves to show the rate of wages in several important districts. As a general rule the rate of wages is considerably higher in the corn-growing districts than in the grazing districts, employment being much more abundant in the former than in the latter, and the creation of wealth very much greater. One great difference

* Return of the Average Rates of Weekly Earnings of Agricultural Labourers in the Unions of England and Wales, in respect of the Michaelmas and Christmas quarters, 1869, and the Lady Day and Midsummer quarters, 1870; Quarter ending Michaelmas, 1869 (Mr. Goschen). Ordered by the House of Commons to be printed, 29th July, 1869. No. 371.

between the corn-growing districts, especially when cultivated on the four-course system (in which wheat, barley, turnips, and clover are grown in succession), or any similar rotation, and mere pasture and grass land, is, that they employ the labour of men, women, and children nearly all the year round in one occupation or another, whilst mere grass land affords little employment for men, and scarcely any for women and children. In addition to this, the produce of the soil under the former system is said to be four times as great as it is under the latter.

In comparing the weekly wages, without food, of men working as agricultural labourers, in several unions of England and Wales, for the quarter ending Michaelmas, 1869, we find the following results:—In the county of Surrey, the weekly wages of men are 14s., in the Epsom and Godstone districts; in Kent, they are 15s., in the Faversham and Romney Marsh districts, and 14s. in the Eastry district; in Sussex they are 13s. 6d. in Ticehurst, 13s., or 13s. 6d., in West Humpnett and 11s. in Midhurst; in Hampshire they are 11s., in Broxford and Andover; in Berkshire they are 12s. in Hungerford and 11s. in Farringdon; in Hertfordshire they are 17s. 11d., in Hitchin, and 11s. 3d. at Royston; in Northamptonshire they are 13s., at Peterborough and 12s. at Blisworth and Oundle; in Huntingdonshire they are 16s., at St. Neots; in Bedfordshire, they are 11s., at Bedford and Woburn; in Cambridgeshire they are from 10s. to 12s. at Chesterton; in Essex they are 15s. at Billericay, 12s. at Tendering and 10s. at Dunmow; in Suffolk, they are 9s. to 12s. at Stowmarket and about 11s. at Sanford and 10s. at Blything; in Norfolk wages are 10s. to 12s., at Aylsham, 10s. at Depwade and 10s. at Downham; in Wiltshire wages are 11s. 6d. at Devizes and 10s. to 12s. at Alderbury; in Dorsetshire 9s. 6d.; at Winburne, and Cranbourne, 10s. at Wareham and Purbeck, and 9s. at Cerne; in Devonshire wages are 11s. at Oakhampton; 9s. at Tiverton and 8s. to 9s. at Axminster; in Cornwall 11s., at Camelford; in Somersetshire, 10s. to 12s. at Shepton Mallett, and 11s. at Axbridge; in Gloucestershire, 13s. 6d. at Newent, 10s. to 12s. at Stroud, and 12s. at Cheltenham; in Herefordshire, 10s. at Hereford and Bromyard, and 10s. 6d. at Ledbury; in Shropshire 11s., at Shiffnal, and 10s. to 12s. at Hatcham; in Staffordshire 13s., at Burton-upon-Trent; in Worcestershire 13s. 4d. at Stowbridge, and 11s. according to one return, and 13s. 9d. according to another, at Evesham; in Warwickshire, 12s. at Warwick, and 11s. at Stratford-

on-Avon; in Leicestershire, 13s. to 15s. at Market-Bosworth, and 13s. at Melton Mowbray; in Lincolnshire 14s. at Louth; in Derbyshire 12s. to 15s. at Ashbourne; in Cheshire 15s. at Runcorn, and Hawarden, and 12s. at Nantwich; in Lancashire, 15s. at Ormskirk and Clitheroe; in Yorkshire 15s. to 18s. at Settle, 15s. at Pateley Bridge, 14s. at Doncaster, 21s. at Thorne, 19s. 9d. at Malton, 15s. at Leyburn, and 15s. to 18s. at Richmond; in Durham, 15s. at Darlington, and 18s. at Sedgfield; in Northumberland 16s. to 18s. at Morpeth; 15s. at Berwick-on-Tweed and Glendale; in Cumberland 15s. at Bampton and Wigton; and in Westmoreland 14s. 6d. in East Ward, and 18s. at Kendal. These are stated to be the wages paid in the Michaelmas Quarter, and are no doubt higher than the average wages, owing to the extra employment in the harvest months.

Summary of the Agricultural Products of Yorkshire in 1870.—Until very recently there was no information that could be relied upon as to the nature and produce of the agriculture of this county, or any other part of the United Kingdom. It was not known what portion of the land was in grass, what was in tillage, how much grain, or what quantity of roots or clover was grown, what numbers of sheep and cattle were fed, or how many persons were employed as farmers in carrying on the cultivation of the soil. Happily this want of information no longer exists, the official returns now laid before Parliament every year showing at once the greatness and the nature of the agricultural wealth of the United Kingdom, and of every county in the three kingdoms.

These valuable returns enable us to ascertain the agricultural produce of each of the three Ridings of the county of York, and of the whole of Yorkshire, and to compare it with that of other counties, and also with that of the kingdom generally. The following facts, from the returns for the years 1868 and 1869, show what was the position of each of the three Ridings, with regard to the number of its inhabitants, to its mode of cultivation, and to the cattle and animals reared on its soil, in the two last years for which returns have been made.

The population of England in the year 1869 amounted to 20,658,599 persons; that of Great Britain to 25,075,088; that of the United Kingdom to 30,759,555; and that of the county of York to 2,224,831. The population of each of the three Ridings, and of the whole county of York, was as follows:—

East Riding, including city of York,	297,989
North Riding,	269,740
West Riding,	1,657,102
Total,	2,224,831*

The total area of England in statute acres is 32,590,397; that of Great Britain is 56,964,260 acres; and that of the United Kingdom, 77,513,585; whilst the areas of the three Ridings of Yorkshire and of the whole county of York are as follows, according to the returns of the Registrar-general:—

	Statute Acres.
East Riding, including the city of York,	771,139
North Riding,	1,350,121
West Riding,	1,709,307
Total,	3,830,567

The above is the number of acres in the county of York, according to the Registrar-general's Return; but this is what is merely called the "Registration County," and excludes considerable quantities of Yorkshire territory which are given in other counties. The real extent of this great county, as ascertained in the recent Ordnance Survey, is 3,923,697 acres.

The number of occupiers of more than five acres of land, owning live stock, or of occupiers of land only, of the same extent, in England, amounted in the year 1868 to 385,577, and in 1869 to 405,264; whilst in the three Ridings of Yorkshire it was as follows:—

	1868.	1869.
East Riding, including the city of York,	8,330 ...	8,703
North Riding,	15,332 ...	15,592
West Riding,	30,174 ...	31,709
Total,	53,836* ...	56,004

The average acreage returned as held by each occupier in England, in the year 1868, was sixty acres, and in 1869, fifty-eight; in the East Riding of York it was seventy-eight acres, and seventy-seven; in the North Riding, fifty-one acres; and in the West Riding, thirty-seven acres.

The total number of acres of land under all kinds of crops, bare fallow, and grass in England, in the year 1868, was 23,038,781,

* Agricultural Returns of Great Britain; with Abstract Returns for the United Kingdom, British Possessions, and Foreign Countries, 1868 and 1869. Presented to both Houses of Parliament by command of Her Majesty.

and in 1869, 23,370,502. The quantity in the county of York, in the same years (1868 and 1869), was as follows:—

	1868.		1869.
East Riding,	646,465	...	668,712
North Riding,	786,825	...	798,699
West Riding,	1,128,211	...	1,140,871
Total,	2,561,501*	...	2,608,282

The quantity of land under corn crops of all kinds in England in 1868 was 7,499,218 acres, and in 1869, 7,785,033. The number of acres of corn grown in the county of York in the same years was as follows:—

	1868.		1869.
East Riding,	274,800	...	288,493
North Riding,	225,064	...	230,082
West Riding,	254,131	...	268,154
Total,	753,995	...	786,729

The quantity of land under green crops, such as turnips, mangolds, potatoes, carrots, and other roots, in England in 1868, was 2,585,019 acres, and in 1869, 2,759,098. The quantity in Yorkshire was as follows:—

	1868.		1869.
East Riding,	100,318	...	109,641
North Riding,	73,886	...	79,353
West Riding,	95,979	...	104,643
Total,	270,183	...	293,637

The total number of acres of land under clover and artificial and other grasses under rotation in England in 1868 was 2,370,638 acres, and in 1869, 2,004,902. The total in Yorkshire was as follows:—

	1868.		1869.
East Riding,	87,117	...	77,363
North Riding,	67,291	...	56,960
West Riding,	91,261	...	59,034
Total,	245,669	...	193,357

The amount of permanent pasture or grass land not broken up in rotation (exclusive of heath or mountain land) in England in 1868, was 9,703,884 statute acres, and in 1869, 10,096,094. The quantity of permanent grass land under pasture in Yorkshire is extremely large, as will be seen by the following figures:—

* Agricultural Returns of Great Britain; with Abstract Returns for the United Kingdom, British Possessions, and Foreign Countries, 1868 and 1869. Presented to both Houses of Parliament by command of Her Majesty.

	1868.	1869.
East Riding,	155,008 ...	166,396
North Riding,	382,833 ...	397,846
West Riding,	659,333 ...	685,438
Total,	1,197,174 ...	1,249,680

The quantity of cattle and sheep kept on the extensive and, in many cases, rich grass lands of Yorkshire, and even on the heath-covered mountains and moors, is very large, and forms a chief item in calculating the results of the agricultural production and the agricultural wealth of this county. The total number of cattle in England, in 1868, was 3,779,691, and in 1869, 3,706,641; whilst the number returned as kept in Yorkshire was:—

	1868.	1869.
East Riding,	77,206 ...	76,886
North Riding,	148,256 ...	146,190
West Riding,	231,996 ...	222,789
Total,	457,458 ...	445,865

The number of sheep returned as existing in England on the 28th June, 1868, was 20,930,779, and in 1869, 19,821,865. The number in Yorkshire was as follows:—

	1868.	1869.
East Riding,	593,056 ...	539,981
North Riding,	744,744 ...	698,279
West Riding,	823,214 ...	735,900
Total,	2,161,014 ...	1,974,160

Yorkshire is the great county for horses, containing more than the tenth part of all the horses in England, according to the return for 1869. There were no returns of horses previous to that year, but in 1869 it was found that the number of horses, returned by occupiers of land only, in the whole of England, was 1,141,996. There are also immense quantities of horses in all the large towns, and in the smaller towns, and even in many villages, which are used for other purposes than those for which they are used by the occupiers of land. But we have no means at present of stating their number. With regard to the horses returned by the occupiers of land in the county of York, their numbers were as follows:—

	1868.	1869.
East Riding,	No return ...	40,622
North Riding,	" ...	41,991
West Riding,	" ...	60,742
Total,	" ...	143,355

Yorkshire being one of the principal counties for the breeding of horses, the number of young horses, under two years of age, is very great, amounting in 1869 to 25,133 in the whole county. The number in each Riding was rather more than 8000.

The number of pigs in England on the 25th June, 1868, was 1,981,606, and in 1869, 1,629,550; whilst the number in Yorkshire was as follows:—

	1868.	1869.
East Riding,	45,879 ...	40,064
North Riding,	52,058 ...	46,085
West Riding,	60,200 ...	52,171
Total,	158,137 ...	138,320

Summary of the Agricultural Produce of Yorkshire in the Years 1868 and 1869.—It may be well to show in a single table the agricultural produce of the whole of Yorkshire in the years 1868 and 1869; estimating the quantity of grain per acre according to the numbers given in Mr. William Wright's Prize Report:—

SUMMARY OF THE AGRICULTURAL PRODUCE OF YORKSHIRE.

	Statute Acres.	Statute Acres.
CORN CROP.	1868.	1869.
Wheat,	316,088	331,579
Barley,	166,770	169,949
Oats,	210,726	208,497
Rye,	5,279	6,332
Beans,	35,129	42,893
Peas,	18,003	27,479
Total corn,	753,995	786,729
ROOTS, GRASSES, &c.		
Potatoes,	43,527	53,669
Turnips and Swedes,	196,388	196,385
Mangold,	3,283	5,735
Carrots,	335	443
Cabbage, kohl, rabi, and rape,	12,910	16,124
Vetches, lucerne, &c.,	13,640	21,281
Total under green crops,	270,183	293,637
Flax,	6,310	7,746
Hops,	6	5
Clover, sainfoin, and grasses under rotation,	245,669	193,367
Permanent pasture, meadow, or grass not broken up in rotation (exclusive of heath or mountain land),	1,197,174	1,249,680
Woods and wood lands, heath or mountain land, lakes, estuaries, rivers, towns, villages, roads, and land not otherwise accounted for,	1,450,366	1,392,537
ANIMALS.		
Cattle,	457,458	445,865
Sheep,	2,161,014	1,974,160
Pigs,	158,137	138,320
Horses in hands of farmers,	No return.	143,355

THE MINERAL WEALTH OF THE NORTH RIDING.

The mineral wealth of the North Riding is exceedingly great, especially in the two chief articles of iron and lead, which are amongst the principal means of modern industry. The production of iron ore and of iron, in the county of York, is much larger than that of the same articles in any other English county; and there is every reason to believe that it will continue to increase with undiminished rapidity. It appears from the Mineral Statistics of the United Kingdom, for the year 1868, that the quantity of iron ore produced in the county of York that year was 3,570,935 tons, of the value, at the pit's mouth, of £898,240. The quantity of pig iron produced in the same year, in the North Riding of Yorkshire, was 699,494 tons, and in the West Riding, 100,050 tons, making the total production of pig iron in Yorkshire in that year 799,544 tons. In the same year the quantity of lead ore produced in the county of York was 7693 tons 16 cwts.; the quantity of lead was 5654 tons 12 cwts.; and the quantity of silver was 2500 ounces. The whole production of iron ore in England, Scotland, and Wales, in 1868, amounted to 10,169,231 tons 10 cwts., of the value of £3,146,600, of which Yorkshire supplied 3,570,935 tons; and the whole production of pig iron in Great Britain in the year 1868 amounted to 4,970,206 tons, of the value of £12,425,515, of which the quantity produced in Yorkshire was 799,544 tons, of the value of £898,240. The quantity of iron pyrites or sulphur ores produced in Yorkshire, in the same year, was 3000 tons, of the value of £1450.

Ironstone of the Yorkshire Lias.—In the account of the Iron Ores of Great Britain published in the Memoirs of the Geological Survey of Great Britain in the year 1856, we have one of the best accounts that has been published of the great discoveries of ironstone in the Lias formation of the North Riding of Yorkshire. In this work we are informed, that not more than eight years had then elapsed, since attention was accidentally directed to loose masses of a ferruginous substance, which were strewn over the beach on the north-eastern coast of Yorkshire; and experiments made at the furnaces of Messrs. Bolckow and Vaughan, near Bishop Auckland, proved it to be worth smelting as an ore of iron. Yet some little time elapsed before it was observed that these loose blocks had fallen from the higher ground, in which a massive bed of the same material might be

traced by its outcrop, for miles and miles along the escarpment of the Cleveland hills.

On the coast line, and again at a small elevation above the flat land which extends from Redcar to Middlesborough on Tees, there crops out to the surface a solid stratum of no less than fifteen feet thick of an ironstone, which, although said to contain on an average about thirty per cent. of iron, presents such an appearance as readily to account for its value being so long overlooked. Situate near the top of the Lias formation, in a position corresponding to the marlstone, it would easily pass muster for an ordinary sandstone, with only its external surface more or less rusted by the peroxidation of iron. It is, in fact, a sometimes massive, at others inter-laminated with shaley bands, deposit of a greenish or gray colour, divided by a system of nearly vertical joints, having a structure generally oolitic, and in the spherules of which Mr. Bowerbank recognizes, under the microscope, concentric coatings. It contains numerous well known fossils of the marlstone, especially Belemnites and *Pecten æquivalvis*, many of which are in a very fine state of preservation.

This remarkable seam extends over some hundreds of square miles, although with a gradually diminishing thickness as it is traced southward towards Whitby and Castleton, and thence to Thirsk, where it appears to thin out. It is capped by sandy shales containing scattered nodules of ironstone, and ultimately, above the marlstone series to which it belongs, by the Upper Lias shale, so well known along the Whitby coast for its fossils, jet, and the application of some of the beds to the manufacture of alum. The Upper Lias shale, although 200 feet thick on the coast, is much less towards its western limit; and thus in the Thirsk district the marlstone is succeeded, within a very small distance, by the Lower Oolite series, which there acquires practical importance from containing several bands of workable ironstone.

The great Lias bed is nowhere better developed than at Eston, near Middlesbrough, where, as well as for some miles to the south and east, it is now actively worked. Self-acting inclined planes have been carried up the lower slope of the hills and led into the workings, which are conducted on what is termed the board and pillar system.

Such was the origin of the discovery of the Cleveland iron field, now the richest in England. The following account will show both

the nature of the field and the progress which has been made in developing it:—The Cleveland ironstone, at its outcrop, where it has been for centuries exposed to atmospheric influences, has become a brown oxide; but from the interior of the mine it is a lightish blue carbonate, porous, granulated, and oolitic where the bed is thick and undivided towards the north; but a carbonate of a lighter colour, more compact, less oolitic, and approaching more to clayband ironstone towards the south. In the deposition of the ironstone beds, nature appears to have scattered more iron in some localities than in others; and as a general law, with some exceptions, where she has laid down a thick and undivided bed, it is not only larger in quantity, but generally a little richer in iron, than where the same bed southward is divided and split into thicknesses of three or four feet each by wedge-shaped shale beds, with their points to the north. The thick parts of the bed yield thirty-one to thirty-two per cent. of iron; while the thinnest parts, worked many miles away, yield only from twenty-six to twenty-eight per cent., but the bed gives a somewhat superior quality of iron. At Eston it attains its greatest thickness, being in some parts about fifteen feet of ironstone, the whole of which is workable, save a layer of two feet in thickness left to support the roof. From Eston the bed gradually but slowly decreases in thickness to the south-east, but more rapidly so to the south-west. It has been said that the 'Great Whin Dyke,' which passes to the south side of Roseberry, and down the valley of the Esk, has been the cause of the splitting and deterioration of the ironstone bed to the south; but this idea can scarcely be supported when we know that the Lias strata, with the ironstone beds, were deposited long anterior to their having been split asunder, and the cavity filled up with basaltic matter.

The Cleveland district may be divided into three parts or ranges of hills; the first comprising Normanby, Eston, Upleatham, and Hobhill mines, which in 1870 yielded about 29,000 tons of ironstone per week. The mines in the second range of hills yielded about 29,280 tons of ironstone per week; and the yield of the third range of mines was probably 1400 tons per week, but since that time the production has increased very much, and is still being extended. Hitherto the main bed of ironstone only has been named. There is, however, another of some importance in a commercial point of view. This is called the "top bed" of Cleveland

ironstone. Its geological position is about 230 feet above the main bed, and is found on the top of the Upper Lias or alum shales; and although the main bed varies in thickness and quality in different localities, the top bed has a much greater range of variation. Here it will be found thinned out to two or three bands of clay ironstone, from two to six inches thick; there expanded to a thickness of twenty-four feet; but the additional matter it contains is nearly all sand, and the bed at such places can be called little else than a ferruginous sandstone. In one locality it is thick and rich in iron; in another thin and poor; and these are often reversed, so that the deposition of the top bed appears to have been governed by an eccentric law: generally it is most valuable when the bed is from four to six feet thick. At present it is worked in three places only in Cleveland; that is, Port Mulgrave on the coast, Glaisdale, and Rosedale. At the first-named place it is worked by Messrs. Palmer & Co., and is even richer in iron than the bottom bed, which this company work also, below sea-level; and when the two are smelted together it is said they produce a good quality of iron—the alumina of the bottom bed correcting the silica of the top. At some future time, the better parts of the top bed may be more generally, as well as advantageously, used as a mixture with the bottom bed. At Glaisdale the bed is worked about six or seven feet thick, but has only lately been opened out. In Rosedale the top bed is worked very extensively, supplying ten or eleven blast furnaces of gigantic size. It is about twelve feet thick, and said to contain a large percentage of iron. It is, however, generally too silicious for making first-class iron when smelted alone; and unless it is very skilfully treated in the blast furnace, a silicate of iron is found in the pig, which makes it somewhat brittle.* At Rosedale there are extensive deposits of magnetic oxide of iron, filling cavities underneath the top seam.

Description and Analysis of the Cleveland Iron Ore.—It is chiefly a carbonate of protoxide of iron; lustre, earthy; colour, greenish gray; streak, similar; fracture, uneven, showing here and there small cavities, some of which are filled with carbonate of lime. Throughout the ore are diffused irregularly a multitude of small oolitic concretions, together with small pieces of an earthy substance resembling the ore, but lighter in colour. When a mass of this ore is digested in hydrochloric acid till all carbonates and soluble silicates are dissolved, there remains a residue having the

* T. Allison, in Transactions of South Wales Engineers.

form of the original mass of ore. It is extremely light, and falls to powder unless very carefully handled. It contains the oolitic concretions, or else skeletons of them, which dissolve completely in dilute caustic potash, showing them to be silica in a soluble state. Under the microscope some of them are seen to have a central nucleus of dark colour and irregular shape, but none of them present any indication of organic structure, or radiated crystallization. If the residue, after having been digested in caustic potash, be washed by decantation, there remains a small number of microscopic crystals; some of these, which are white, are quartz, and others, which are black and acutely pyramidal, consist chiefly of titanitic acid. Professor Miller of Cambridge succeeded in measuring some of the angles of the crystals containing titanitic acid, and found that they corresponded to similar angles in anatase. The green colour of the ore seems to be due to a silicate containing peroxide and protoxide of iron, but this could not be exactly determined, because it was not found possible to dissolve out the carbonates without acting at the same time upon the silicate of iron.

RESULTS TABULATED.

Protoxide of iron,	39.92
Peroxide of iron,	3.60
Protoxide of manganese,	0.95
Alumina,	7.86
Lime,	7.44
Magnesia,	3.82
Potash,	0.27
Carbonic acid,	22.85
Phosphoric acid,	1.86
Silica, soluble in hydrochloric acid,	7.12
Sulphuric acid,	trace.
Bisulphide of iron,	0.11
Water, in combination,	2.97
Organic matter,	trace.
Insoluble residue (of which 0.98 is soluble in dilute caustic potash), and consists chiefly of oolitic concretions,	1.64
	100.41
Iron, total amount,	33.62

INSOLUBLE RESIDUE.

Silica,	1.50
Alumina, with a trace of peroxide of iron,	0.10
Titanic acid, about	0.03
Lime,	trace.
	1.63

No metal precipitable by sulphuretted hydrogen from the hydrochloric acid solution of about 1200 grains of ore was detected.

With a special view of showing the great extent of the iron trade of Yorkshire, as well as of exhibiting the manner in which the production of iron is distributed in the different districts of England, Scotland, Ireland, and Wales, it may be well to bring together, in a single table, the amount of the production of iron ore in every part of the United Kingdom. The last report of the Mineral Statistics of the United Kingdom, published in the autumn of 1869, enables us to bring this interesting information very nearly down to the present time. The following table, taken from that work, shows how widely this great industry is now distributed, and at how many points in the British Islands this most useful of metals is found.

QUANTITY AND VALUE OF THE IRON ORE PRODUCED IN THE DIFFERENT COUNTIES OF ENGLAND, AND IN SCOTLAND, IRELAND, AND WALES, IN THE YEAR 1868.

Counties, &c.	Quantities.		Value.		
	Tons.	Cwts.	£	s.	d.
Cornwall,	8,310	5	2,460	11	6
Devonshire,	11,178	1	3,667	19	1
Somersetshire,	32,450	10	12,168	0	0
Gloucestershire,	167,288	0	75,333	18	0
Wiltshire,	75,084	0	30,033	0	0
Northamptonshire,	449,116	8	112,278	18	0
Lincolnshire,	205,699	6	51,424	16	6
Shropshire,	278,541	0	69,635	0	0
Warwickshire,	14,795	0	3,698	13	0
Staffordshire (North),	786,881	0	214,446	0	0
“ (South),	340,578	0	86,908	0	0
Derbyshire,	368,440	0	91,860	0	0
Northumberland and Durham,	125,000	0	31,250	0	0
Lancashire,	767,625	0	383,812	10	0
Cumberland,	926,628	0	610,370	8	0
Yorkshire,	3,570,935	0	898,240	0	0
North Wales,	36,313	0	10,536	1	0
South Wales and Monmouthshire,	712,680	0	182,897	15	0
Isle of Man,	220	0	66	12	0
Scotland,	1,250,000	0	305,000	0	0
Ireland,	41,469	0	10,492	5	0
Total Iron Ore Production of the United Kingdom,	10,169,231	10	£3,196,600	7	1

One of the principal causes of the rapid increase of the iron trade of England, during the last twenty years, has been the discovery of iron ores similar to those of Cleveland, not only in those districts of Yorkshire which rest upon the Lias and Oolite formations, but at many other points along the same formation from Yorkshire, through the midland counties of England. Iron, like all substances which are necessary or highly conducive to

human use, is very widely diffused, and especially in this country, in which nearly all the strata existing throughout the world are found in considerable quantities. Originally the iron ores most used in England were found in the Wealden formations of Sussex and Kent, and were smelted by the fuel supplied by the great forests, which in early times covered the principal part of these two counties. After those forests had been consumed in the iron furnaces, the iron trade was transferred to the carboniferous formation, in which iron is found on nearly all the coal-fields of England, and at several points on the mountain limestone. These are still the principal sources of supply in Great Britain. During the last thirty years new and extensive supplies of iron ore have been found in the Lias and Oolite, which extend through the greater part of England, from the coast of Yorkshire to the coast of Dorsetshire. Much the largest portion of the iron ore of these formations is obtained in the North Riding or Cleveland district, where the yield amounted to 2,785,307 tons, in the year 1868. But large quantities of iron ore are also obtained in the Lias or Oolite formations of Lincolnshire, Northamptonshire, and Wiltshire, and smaller quantities in Bedfordshire and Oxfordshire. In the year 1868, Lincolnshire supplied 205,699 tons, Northamptonshire 449,116 tons, and Wiltshire 75,084 tons; making the total quantity yielded by these new sources of supply more than 3,250,000 tons annually. According to Professor Phillips, the area under this bed which may be worked in Yorkshire, measures in the North Riding of York some hundreds of square miles, with an average produce of 20,000 to 50,000 tons per acre. It dies out southward, and vanishes about Thirsk; but there are other ironstones of considerable value found in the oolitic series above.

We have already given an account of the several points at which the iron ores of the West Riding are found. Those of the North Riding are now worked at numerous points in the Cleveland district, and it is the opinion of some geologists that they are not confined to that district only. One great advantage of the Cleveland district is its proximity to the sea, and to good seaports; and another not less important advantage is its proximity to the rich and great coal-field of the county of Durham. The following are the principal points at which the iron ores, both of the North and the West Riding, were worked in the year 1868, and the quantity and the value of the ores yielded at each point, as well as the character of the ore.

IRON ORE RETURNS FOR YORKSHIRE.

District or Mine.	Character of Ore.	Quantities.		Value.		
		Tons.	Cwts.	£.	s.	d.
NORTH RIDING, OR CLEVELAND DISTRICT.						
Eston and Upsal, . . .	Argillaceous Carbonate.	715,248	0	178,812	0	0
Upleatham, . . .	" "	573,566	0	143,391	5	0
" (Hob Hill), . . .	" "	298,769	0	74,692	5	0
Lofthouse, . . .	" "	243,903	0	60,975	15	0
Normanby, . . .	" "	169,769	0	42,692	5	0
Margrave Park, . . .	" "					
Cliff Mine, . . .	" "	90,417	0	22,604	5	0
Skelton, . . .	" "	155,950	0	38,987	10	0
Port Mulgrave, . . .	" "	127,372	0	31,843	0	0
Belmont, . . .	" "	60,394	0	15,098	10	0
" (South), . . .	" "	69,672	0	17,418	0	0
Glaidsdale (Yarm), . . .	" "	200	0	50	0	0
Grosmont, . . .	" "	67,443	0	16,860	15	0
Eskdale, . . .	" "	2,522	0	630	10	0
Rosedale,* . . .	Magnesian.	210,082	0	57,777	0	0
Total of Cleveland, . . .		2,785,307	0	701,833	0	0
WEST RIDING.						
Low Moor, . . .	Argillaceous Carbonate.	596,628	0†	149,157	0	0
Farnley, . . .	" "	21,000	0	5,250	0	0
Thorncliffe, . . .	" "	18,000	0	4,500	0	0
Sundry Mines, . . .	" "	150,000	0	37,500	0	0
Total of West Riding, . . .		785,628	0	196,407	0	0
Total of North Riding . . .		2,785,307	0	701,833	0	0
Total of Yorkshire, . . .		3,570,935	0	898,240	0	0

° See North Eastern Railway Return, Ferryhill.

† Raw Stone.

The number of iron furnaces in all parts of Yorkshire amounted to upwards of one hundred in the year 1868. Of these furnaces sixty-nine were in the North Riding, and derived their supplies from the ores of the Lias formation; and thirty-eight were in the West Riding, and obtained their supplies of ore from the coal formation. Some of the latter are of great antiquity, iron having been made in the West Riding at least from the time of Henry VIII. The former are all very modern, and nearly the whole of them have been erected in the reign of Queen Victoria. From the great success, and the magnificent fortunes that have been realized in working the mines in the Lias and Oolite of Cleveland, these strata will no doubt be carefully examined in all those districts of the North and East Ridings through which they pass. Some of these researches will probably fail to discover iron ore in sufficient quantity to render it profitable to work, especially at so great a distance from the fuel both of Durham and the West Riding. Some of them, however, are very likely to be successful.

DETAILS OF BLAST FURNACES IN BLAST IN 1871.

Names of Works.	Owners.	Furnaces Built.	Furnaces in Blast.
NORTH RIDING OR CLEVELAND DISTRICT—			
Cargo Fleet,	Swan, Coates, & Co.	4	4
Clay Lane, Eston Junction, . . .	Thomas Vaughan.	6	6
Cleveland,	Bolekow, Vaughan, & Co., }	8	12
Middlesbro', Witton,	(Limited).		
Glaidsdale, Yarm,	George Wilson & Co.	3	3
Grosmont,	Chas. & Thos. Bagnall, jun.	2	2
Newport,	B. Samuelson & Co.	7	7
Normanby, Middlesbro',	Jones, Dunning, & Co.	3	3
Ormesby, "	Cochrane & Co.	3	2
South Bank, "	Thomas Vaughan.	9	9
Tees, "	Gilkes, Wilson, Pease, & Co.	5	5
Tees Side, "	Hopkins, Gilkes, & Co., }	4	4
Linthorpe,	(Limited).		
Acklam,	Lloyd & Co.	6	6
Thornaby,	Stevenson, Jaques, & Co.	4	4
Ayresome,	W. Whitwell & Co.	3	3
	Gjers, Mills, & Co.	2	2
Total of North Riding,	— — —	69	72
WEST RIDING—			
Ardley, Leeds,	{ West Yorkshire Iron and }	2	1
Beeston Manor,	Coal Co. }		
Bowling,	A. Harding & Co.	2	1
Elsecar, } Barnsley,	The Bowling Iron Co.	6	4
Milton, }	W. H. & G. Dawes.	6	4
Farnley,	Farnley Iron Co.	4	2
Holmes,	Pargate Iron Co. (Limited).	3	3
Pargate,			
Low Moor,	Hird, Dawson, & Hardy.	8	5
Bierley,	Newton, Chambers, & Co.	2	1
Thorncliffe and Chapel Town, }			
Sheffield,			
Worsborough,	Worsborough Iron Co.	1	0
Total of West Riding,	— — —	34	21

The quantity of iron yielded by the different iron ores worked in this country, varies very greatly; some of the ores being so rich as to contain a little over seventy per cent. of pure iron, whilst others do not contain more than forty-five per cent., and some not more than thirty to thirty-three per cent. The general result is, that 4,970,206 tons of iron are yielded by 10,283,170 tons of iron ore of all kinds smelted in Great Britain. The question of whether the ores are worth smelting depends almost as much on the price of fuel, and the cheapness of access to a good market, as upon the percentage of iron contained in the ores. The following tables will show the quantity of pig iron produced in the year 1868 in all parts of the United Kingdom, together with its value at the place of production,

though the make of Cleveland, as also of Lancashire and Cumberland, has increased very rapidly since these statistics were compiled.

SUMMARY OF PIG IRON PRODUCE IN 1868.

Counties.	Number of Iron-works Active.	Number of Furnaces built in District.	Number of Furnaces in Blast.	Tons of Pig Iron Made.
ENGLAND—				
Northumberland,	1	18	1	17,495
Durham,	10	72	35½	499,592
Yorkshire—North Riding, . .	11	69	50	699,494
“ West Riding, . .	9	38	72	100,050
Derbyshire,	11	42	28	159,312
Lancashire,	5	28	22½	325,367
Cumberland,	3	18	8	116,864
Shropshire,	8	29	24	145,154
North Staffordshire,	7	36	25	229,910
South “	41	172	89	532,234
Northamptonshire,	3	8	6	35,584
Lincolnshire,	3	6	5	33,999
Gloucestershire,	3	10	5	75,847
Wiltshire,	1	4	3	
Somersetshire,	1	2	1	
Total,	117	552	325	2,970,905
WALES—				
North Wales.				
Denbighshire,	3	9	4	37,046
South Wales.				
Anthracite Furnaces,	4	23	11	38,148
Bituminous { Glamorganshire, . .	9	75	48	399,291
Coal { Brecknockshire, . .	1	14	5	29,000
Districts. { Monmouthshire, . .	10	72	44	427,821
Total,	27	193	112	931,306
SCOTLAND—				
Ayrshire,	8	50	34	—
Lanarkshire,	14	91	77	—
Fifeshire,	3	13	3	—
Stirlingshire,	1	4	2	—
Haddingtonshire,	1	1	1	—
Argyleshire,	1	1	1	—
Total,	28	160	118	1,068,000

QUANTITY AND VALUE OF PIG IRON MANUFACTURED IN THE UNITED KINGDOM IN 1868.

IRON ORE.—The Total Quantity of Iron Ore raised in the United

Kingdom, as shown in the preceding Returns, amounted to . 10,169,231 tons.

Foreign Ores imported, 114,439 “

Total of Iron Ore smelted in Great Britain, 10,283,170 “

Estimated Value of the Iron Ores of the United Kingdom, £3,291,220.

Number of Furnaces in Blast, 560

Pig Iron produced in England, 2,970,905 tons.

“ “ Wales, 931,301 “

“ “ Scotland, 1,068,000 “

Total production of Pig Iron in Great Britain, 4,970,206 “

This quantity estimated at the mean average cost at the place of
production would have a value of £12,425,515

In addition to iron, a bituminous shale, or brown shaley coal, occurs in the Kimmeridge clay under the name of "Kim coal," and has been used in extracting paraffin. Seams of coal, likewise, which are sometimes workable, occur in the Oolite, as at Gristhorpe in Yorkshire; at Brora in Sutherlandshire; at several places in Germany; in the East Indies, and at Richmond in Virginia. Several of the Oolitic strata, as those of Bath and Portland, and some found in Yorkshire, yield excellent building stone. Both the Lias and Oolite limestones are extensively employed for mortar. The pyritic clays and shales of the Yorkshire Lias yield sulphate of alumina (the alum of commerce), which at one time was also obtained from the Kimmeridge clay. Fullers' earth, composed chiefly of silicum, alumina, and water, and possessing in a high degree the property of absorbing grease, is a product of the Upper Oolite, and was at one time extensively used in the cleansing and scouring of woollens.

It may also be well to give the few figures which are required to show the quantities and values of the metals obtained from the various ores raised in the United Kingdom, in the last year for which we possess an official return, viz., 1868 :—

METALS OBTAINED FROM THE ORES RAISED IN THE UNITED KINGDOM IN 1868.

	Quantities.	Value.
	Tons,	£
Iron, Pig,	4,970,206	12,381,280
Tin,	9,300	901,400
Copper,	9,817	761,602
Lead,	71,017	1,378,404
Zinc,	3,713	75,435
	Ounces,	
Silver,	835,542	229,773
Gold,	1,012	3,522
Other metals (estimated),	—	5,000
Total value of metals produced,		£15,736,416

The following particulars with regard to the value of the whole of the minerals produced in England, are of interest in connection with this account of the mineral wealth of Yorkshire. It will be seen that coal is the most valuable of the mineral products of England. But the greatest security for the progress of any district in industry is that combination of coal and iron, which exists in Yorkshire and a few other favoured counties.

TOTAL QUANTITY AND VALUE OF THE MINERALS RAISED IN THE UNITED KINGDOM IN
THE YEAR 1868.

	Quantities.	Value.
	Tons.	£
Coal,	103,141,157	25,785,289*
Iron Ore,	10,169,231	3,196,600
Tin Ore,	13,953	770,205
Copper Ore,	157,335	642,103
Lead Ore,	95,236	1,150,768
Zinc Ore,	12,781	39,191
Iron Pyrites (Sulphur Ores),	76,484	53,636
Gold Quartz,	1,191	1,000
Arsenic,	3,300	9,710
Gossans and Ochres,	6,692	6,372
Wolfram,	9	67
Fluor Spar,	60	42
Manganese,	1,700	7,650
Barytes,	14,235	8,728
Coprolites,	37,500	71,500
Salt,	1,513,840	927,227
Clays, fine and fire,	1,012,479	650,000
Total Value of Minerals produced in the United Kingdom,		£33,637,858

* Calculated at the actual cost of raising, before any charges for movement are added.

Unexplored Coal-fields.—At the meeting of the British Association held at Nottingham in the year 1866, Sir Roderick J. Murchison, K.C.B., Director-general of Geological Survey, read a paper “On the parts of England and Wales in which coals may and may not be looked for beyond the known coal-fields.” After discussing the probabilities of finding coal in some other parts of England, he made the following observations as to the probabilities of finding it in Yorkshire, to the north and the east of that portion of the West Riding in which it has been so long found. He observed:—

“To widen the application of the inferences respecting those tracts where coal cannot reasonably be sought for, I may extend the reasoning to parts of Lincolnshire and the East Riding of Yorkshire, as well as to a large portion of the North Riding of the latter county. On this head I will first allude to the south side of the valley of the Tees, a tract which I have long known, extending from Croft, by Middleton-on-Row, to the town of Middlesborough, where the new red sandstone, of enormous thickness, is covered by detritus and northern drift. At Middlesborough the ironmaster, Mr. Vaughan, being desirous of obtaining

subterranean water for the working of his engines, sunk an artesian well to the depth of 1800 feet, and at length reached a body of rock-salt, subordinate to the new red sandstone, in fact, without reaching even the surface of the magnesian limestone, through which the deep coal-pits of the east coast of Durham are sunk to the extreme depth at which they have hitherto been worked in that county.

"If, then, the coal measures should be prolonged under ground to the south of the Tees (which, from my observation of the rocks between Seaton Carew and Hartlepool, I greatly doubt, as there are symptoms of a basin-shaped arrangement of the strata), and should pass under the vale of Cleveland, and the hills of the eastern moorlands, what, I may ask, would be the vast depth at which they could be won, by passing through the Oolites and Lias, in addition to the new red sandstone and magnesian limestone?

"In the excellent work on Yorkshire by Professor Phillips, and indeed on all geological maps of England, it is shown that throughout a distance of many miles the lower or unproductive carboniferous rocks of limestone and millstone grit of the Yorkshire dales are at once surmounted by the magnesian limestone of the Permian group.

"On the bank of the Tees, west of Darlington, wherever the magnesian limestone forms the upper stratum, as at Conscliffe, it is at once underlaid by unproductive millstone grit, which on the west lies upon mountain limestone, the productive coal measure which ought to lie between the millstone grit and the Permian rocks being entirely wanting, owing either to great denudation, or to an ancient elevation of the tract after the lower carboniferous period. This uprise of the older rocks seems also to form a southern border of the great Durham coal basin. In fact, no valuable coaly matter has ever had an existence in the tract extending from Barnard Castle, on the Tees, to the south of Harrogate. At the latter place and its environs we have, further, the clearest possible proof of the omission of all the productive coal strata; for the Plumpton rocks and conglomerates underlying the magnesian limestone, and forming, in my opinion, the base of the Permian system, are seen to repose directly on unproductive millstone grit, which, in its turn, rests upon the mountain limestone of the western dales of Yorkshire. But whilst I give this as not merely my opinion, and that also of Professors Phillips and Sedgwick, who have surveyed the

tract in question, and also that of many sound geologists, I may state that Mr. Lonsdale Bradley, acting for my friend Mr. Webb, of Newstead Abbey, is conducting experimental borings through the red sandstone and magnesian limestone between Northallerton and the Tees, in the persuasion that, as the mountain or carboniferous limestone disappears rapidly beneath the superjacent deposits to the east of Middleton Tyas, there may be found a productive coal-field, like that of Durham or Leeds, between the strata which they are now piercing, and the subjacent carboniferous limestone.

"This view is well explained in the diagrams which Mr. Lonsdale Bradley has allowed me to exhibit on this occasion. I must, however, declare that I think the probabilities are entirely against the success of this enterprise; though, as geologists, we commend Mr. Webb for making this trial, by which he will have done good service to our science.

"To the south of Harrogate the great coal-fields of Leeds and the West Riding appear with a well-defined boundary of millstone grit on the north and west. To the east, however, of the known boundary of these fields there is a fair probability that some coal may be found to extend under the magnesian limestone and new red sandstone.

"As we proceed southward along the escarpment of the magnesian limestone, in its range from Yorkshire into Nottinghamshire, and thus flank successively the Sheffield and Derbyshire coal-fields, we find a progressive thickening of the coal which lies beneath the Permian rock. Whilst thin and poor beds only have as yet been worked in the south of Yorkshire, beneath the magnesian limestone, we now know, thanks to the spirit and energy of the late duke of Newcastle, that at Shire Oaks good seams of coal, the prolongation of the Sheffield field, are worked to profit."

Progress of Population in the North Riding of Yorkshire.—The North Riding is on the whole a thinly peopled country, partly owing to the great extent of the moor and mountain land which it contains, on both sides of the vale of York and Mowbray. Nearly one half of the North Riding consists of grazing land, and the other half of arable land; and it is only within the last twenty years that those rich beds of iron ore have been discovered, which must in course of time bring together a large population in the district in which they exist. Already Middlesboro', which is both the chief town and the seaport of the iron district of Cleveland, has grown up in about

twenty years from the position of a mere fishing village, to that of a populous and well built town, possessing all the requisites of modern civilization, and returning a member to the House of Commons. Stockton, which borders on the northern limits of the county, is also advancing rapidly, and has likewise become a parliamentary borough. The other towns of the North Riding are chiefly the seaports along the sea-coast. The most ancient, as well as the most celebrated of these, are Scarborough and Whitby, both of which were places of note in the Anglian period. In the interior, Malton, which stands on the site of an old Roman station, is the most important town, and, like Thirsk, North Allerton, and Richmond, returns a member to Parliament. The most thinly peopled portions of the North Riding are the grazing districts, which include nearly the whole of the mountain limestone and the millstone grit; the average population is found on the arable land of the new red sandstone and the Oolite; and the more thickly peopled districts are on the Lias formation, rich in iron ore, or about the seaports and watering places along the sea-coast. It will be seen the largest population is around Middlesboro', Scarborough, Thirsk, Whitby, Bedale, and Richmond. The following table will show the progress of population in the different districts of the North Riding of Yorkshire during the present century :—

PROGRESS OF POPULATION IN THE NORTH RIDING OF YORKSHIRE.

District.	Area in Acres.	Population.			Num. of persons to square mile.
		1801.	1851.	1861.	
Scarborough, . . .	81,460	13,673	24,615	30,425	193
Malton,	112,407	14,837	23,128	23,483	132
Easingwold, . . .	63,603	8,512	10,211	10,148	107
Thirsk,	62,444	9,595	12,760	12,299	131
Helmsley,	131,516	10,539	11,734	11,832	53
Pickering,	88,062	7,133	9,978	10,549	73
Whitby,	90,371	18,217	21,592	23,633	153
Guisborough, . . .	96,862	9,954	12,202	22,128	81
Stokesley,	79,345	7,580	9,387	10,381	92
Northallerton, . .	68,342	9,633	12,460	12,174	67
Bedale,	44,588	7,503	8,980	8,650	126
Leyburn,	84,918	8,220	10,057	10,105	76
Askrigg,	77,308	5,205	5,635	5,649	47
Reeth,	70,267	5,739	6,820	6,196	62
Richmond,	78,569	11,366	13,846	13,457	113

Middlesboro' is not one of the registration districts of the North Riding, but the great and rapid increase of population in the

Guisborough and adjoining district, of which it is the port, is caused by the sudden growth of the iron trade of Cleveland.

North Riding of Yorkshire.—*Scarborough*, the most beautiful and fashionable watering place in the north of England, is situated in the wapentake of Pickering Lythe, and the liberty of Scarborough. Its castle is a place of great natural strength, and it possessed a strong castle even before the Norman conquest. It is mentioned in the early wars between the Saxons and the Danes, but was afterwards much more strongly fortified by the Normans, and was for many ages considered one of the strongest places on the coast of England. The fisheries of Scarborough have always been celebrated, and in very early times collected around it an active population of seamen. For the accommodation of the seafaring population of the town and port, and of the vessels sailing along their rock-bound coast, a pier was constructed at Scarborough in the reign of Henry III., in the year 1252, which, from being named the New Pier, was no doubt built in the place of a pier of still earlier date. From the time of Henry III. to the present there has been a succession of piers, constructed at various times. In the 5th of George II. an Act was passed for enlarging the pier and harbour of Scarborough, under which the then existing pier was extended to a length of 1200 feet. But these piers have been greatly extended and improved in recent times.

The great cause of the rapid growth and the present prosperity of Scarborough is its many attractions as a bathing place. The town is situated in the recess of a beautiful bay on the shore of the German Ocean, in a central situation between Flamborough Head and Whitby, and has excellent communication by railway with all parts of England, though there must be many persons still living who well remember when the only communication into the interior was by means of the royal mail and three or four stage coaches.

The registration district of Scarborough extends over 81,460 statute acres. In 1801 the population was 13,673; in 1851, 24,615; and in 1861, 30,425. The average population per square mile of the Scarborough district, at the census of 1851, was 193 persons, and it has continued to increase rapidly to the present time. Scarborough is one of the very few English seaports which stand upon the Oolite formation, which is almost everywhere remarkable for its fine scenery, and more especially at Scarborough

and Portland, the principal points at which it is exposed to the action of the waves of the sea.

Malton.—Malton, in the wapentake of Rydale, eighteen miles from York and twenty-two from Scarborough, stands on the site of an ancient Roman station. It is on the river Derwent, at the foot of the Wolds, and seems to have been the point at which several Roman roads joined each other. Six of these roads have been traced, and numerous Roman coins have been discovered near the point of junction. It afterwards became a residence of the Anglian kings of Northumberland, whose capital was at York. Malton has been a parliamentary borough and a municipal corporation from very early times. The river Derwent has been made navigable up to Malton, and the railway from York to Scarborough connects it with those places, and with the general system of English railways.

The registration district of Malton is very extensive, covering an area of 112,407 acres. The population of this district in 1801 was 14,837 persons; in 1851, 23,128; and in 1861, 23,483. Malton stands on the Oolite formation, and is the centre of an extensive district of land of the best quality.

Easingwold is a market town about ten miles from Thirsk, pleasantly situated on a rising ground commanding an extensive view over the ancient forest of Galtees and the vale of Mowbray.

The registration district of Easingwold extends over an area of 63,603 acres. The population in 1801 was 8512 persons; in 1851, 10,211; and in 1861, 10,148. Easingwold stands on the Lias formation, which is everywhere remarkable for its strong soils and its extensive pastures.

Thirsk.—Thirsk is a market town, and an important railway junction, in the wapentake of Birdforth, pleasantly situated in the vale of Mowbray. It sends one member to Parliament. Its principal trade is in agricultural produce.

The registration district of Thirsk covers an area of 62,444 acres. The population of this district in 1801 was 9595; in 1851, 12,760; and in 1861, 12,299. Thirsk stands at the point at which the Lias and the new red sandstone formations meet each other. It is the chief place in the vale of Mowbray, one of the finest and most fertile portions of the great central valley of Yorkshire.

Helmsley—in the wapentake of Rydale, six miles from Kirkby Moorside, sixteen from Malton, and twenty-three from York—is a

small market town situate on a gentle declivity, sloping towards the banks of the river Rye. The adjacent country is very fertile, and the scenery amongst the most beautiful in England. This is the Helmsley which is spoken of by Pope as "Buckingham's delight," and here it was, in his magnificent castle, that George Villiers, the second duke of Buckingham, lived in great splendour, whilst it was only a few miles distant, at Kirkby Moorside, that he died in poverty, deserted and abandoned by all his parasites. Duncombe Park, the seat of the earl of Feversham, is the great ornament of this district, which is also enriched by the ruins of Rivaulx Abbey and of Byland Abbey, the latter at the entrance of the vale of York.

The registration district of Helmsley is very extensive, covering an area of 131,516 acres. In 1801 it contained 10,539 persons; in 1851, 11,734; and in 1861, 11,832. Helmsley stands on the Oolite formation, near the point at which the Portland limestone and Kimmeridge clay meet the coral rag and Oxford clay. The higher parts of this district belong to what is called the Inferior Oolite.

Pickering.—In the wapentake of Pickering Lythe, eight miles from Kirkby Moorside, nine from Malton, and eighteen from Scarborough, is a country town pleasantly situated on an eminence, at the bottom of which runs a brook called Pickering Beek. The dukes of Lancaster had an ancient castle here, and the duchy of Lancaster still owns property in Pickering. It was probably the influence of the powerful dukes of Lancaster which obtained for Pickering the right of returning members to Parliament in ancient times, but which it has long since lost.

The registration district of Pickering extends over an area of 88,062 acres. In 1801 it contained 7133 persons; in 1851, 9978; and in 1861, 10,549. Pickering stands on the Oolite formation, and near the point at which the Upper joins the Middle Oolite. It is in the centre of a fine agricultural district.

Whitby.—Whitby, in the wapentake of Whitby Strand, is a very ancient port and town, and returns a member to Parliament, under the Reform Act of 1832. The town was built by the Angles, who named it Streanshalh, or the bay of the watch tower; but it was named Whitby, or the white town, by the Danes when they conquered and settled in this district. The Anglian King Oswy, one of the earliest of the Christian kings of Northumberland, built the celebrated abbey of Whitby.

The abbey of Whitby deserves to be famous as the place which produced the first Anglian, or, if we may use the term, the first English poet. This was Cædmon, a servant in that abbey, who, according to the venerable Bede, was the author of several poems on sacred subjects, which were considered miraculous in those times, and are very interesting even at the present. A number of these poems were preserved by the venerable Bede, and by King Alfred the Great. In our times Cædmon's paraphrase of parts of Scripture, and other poems on the subject which Milton afterwards sang in his "Paradise Lost," have been given to the world, and show the author to have had something of the sacred fire of poetry.

The registration district of Whitby covers an area of 90,371 acres. In 1801 this district contained 18,217 inhabitants; in 1851, 21,592; and in 1861, 23,633. The town stands at the mouth of the river Esk, on the sea-coast, along which are high cliffs containing all the fossils found in the Lower Lias formation, as well as large quantities of iron ore, alum, shale, and beds of jet.

Guisborough, in the wapentake and liberty of Langbargh, in the district of Cleveland, a country rich in minerals, especially in ironstone, vast beds of which have been discovered during the last forty years. The town is pleasantly situated in a narrow but fertile vale, and the town has a neat and pleasant appearance. A handsome town-hall of freestone was built in the year 1821, in the market place. There is a mineral spring about a mile south-east of the town. The first alum works formed in this kingdom were erected here in the reign of Queen Elizabeth, and were solemnly cursed and anathematized by the pope of that day, who had alum works of his own, and did not wish to have any competitors. The works belonged to Sir Thomas Chaloner, who had learnt the art of manufacturing alum whilst travelling in Italy.

The registration district of Guisborough covers 96,862 acres. In 1801 it contained 9954 inhabitants; in 1851, 12,202; and in 1861, 22,128. The rapid increase between 1851 and 1861 was owing to the wonderful increase in the iron manufacture.

Middlesborough is the port of the Cleveland iron district, and has in a few years become a large and populous place, returning one member to Parliament.

Stokesley, in the wapentake and liberty of Langbargh, nine miles from Guisborough, is a small market town of Cleveland, situated on the principal branch of the river Leven, which is a very fine trout

stream. The beautiful and majestic chain of mountains known as the Cleveland hills, and of which Roseberry Topping is the most commanding point, range at a distance of from four to six miles from the town of Stokesley, with a bold and romantic outline, and form a semicircular amphitheatre, of which Stokesley is the centre. The registration district of Stokesley covers an area of 79,345 acres. In 1861, this district contained 7580 persons; in 1851, 9387; and in 1861, 10,381.

Northallerton, in the wapentake and liberty of Allertonshire, on the main line of railway from York to Newcastle, is a brisk market town, pleasantly situated on the side of a rising ground gently sloping towards the east. The market is held on Wednesday, and there are four fairs. There was formerly a strong castle at Northallerton, belonging to the bishops of Durham. The great battle of the Standard was fought at Northallerton, on the 23rd August, 1138. Northallerton has been represented in Parliament from the commencement of the parliamentary system in England, in 26 Edward I., and still returns one member to Parliament. The registration district of Northallerton extends over 68,342 acres. In 1801 this district contained a population of 9633 persons; in 1851, of 12,460; and in 1861, 12,174.

Bedale.—Bedale, in the wapentake of Hang-East and liberty of Richmondshire, is situated in a fine valley, about two miles to the west of Leeming Lane, in a fertile country, equally rich in corn and grass. There was formerly a castle here, built by the Fitzalans, earls of Arundel, but no remains of it now exist. The registration district of Bedale extends over an area of 44,588 acres. The population of the whole district in 1801 was 7503; in 1851, 8980; and in 1861, 8650.

Leyburn, in the parish of Wensley, wapentake of Hang-West, and liberty of Richmondshire, is pleasantly situated, and the neighbourhood presents much picturesque scenery. The remarkable walk called Leyburn Shawl, which passes along the edge of a ridge of rocks to the village of Ruston, is one of the finest natural terraces in England, and presents many beautiful views. The ruined castles of Bolton and Middleham, and the remains of Jerveaux and Coverham abbeys; the celebrated waterfall and cataracts of Aysgarth, and the noble mansion of Bolton Hall, with the winding course of the beautiful river Ure—render this district one of the most interesting in Yorkshire. The registration district of Leyburn extends

over 84,918 acres. In 1801 it contained 8220; in 1851, 10,057; and in 1861, 10,105.

Askrigg, in the parish of Aysgarth, the wapentake of Hang-West, and the liberty of Richmondshire, is situated in the centre of Wensleydale, near the northern bank of the river Ure, in a district abounding with romantic and beautiful scenery. The waterfalls near Askrigg, known by the name of Milgill Force, Whitfields Force, and Hardow Force, the latter five miles above the town, are all beautiful objects. The registration district of Askrigg extends over an area of 77,308 acres. The population in 1801 was 5205; in 1851, 5635; and in 1861, 5649.

Reeth, in the parish of Grinton, wapentake of Gilling West, and liberty of Richmondshire, eight miles from Leyburn, ten from Richmond, and ten from Askrigg. Reeth is situated about half a mile above the conflux of the rivers Artle and Swale, on an eminence sloping to the south, and commanding a view of much beautiful and picturesque scenery. In this district are the rich lead mines of Swaledale, Arkengarthdale, and Redhurst, which enrich the neighbourhood. The registration district of Reeth extends over an area of 70,267 acres. In 1801 it contained 5739 persons; in 1851, 6820; and in 1861, 6196.

Richmond is situate in the wapentake of Gilling West and the liberty of Richmondshire. The town stands on an eminence, boldly rising from the river Swale, which winds with a semicircular sweep at the base of a rock on which the castle stands. It was the ancient residence of the earls of Richmond and Bretagne, or Brittany, close connections of William the Conqueror, who gave it to Earl Alan, his nephew, along with the other Yorkshire estates of the Saxon earl, Edwin. It became the feudal capital of an extensive district extending over the north-western angle of Yorkshire, over the two most northern hundreds of Lancashire, and over a portion of Westmoreland. The registration district of Richmond extends over an area of 78,569 acres. The population in 1801 amounted to 11,366; in 1851 to 13,846; and in 1861 to 13,457.

Annual value of Property in the North Riding of Yorkshire.—The annual value of the property of the North Riding assessed under the property and Income Tax Acts for the three great schedules, A, B, and D, for the year ended the 5th April, 1860, was as follows, in the several collecting districts of the North Riding. As already mentioned, under Schedule A was included a return of the value of

lands, messuages, tithes, manors, fines, quarries, mines, ironworks, fisheries, canals, railways, gasworks, and all other property and profits not comprised in other schedules. Under Schedule B was included farming profits, and under Schedule D the profits derived from trade and commerce.

	Total Gross.	Gross.	Net.
	Annual Value of Property Assessed under Schedule A.	Annual Value of Property Assessed under Schedule B.	Amount of Profits Charged under Schedule D.
	£	£	£
Allertonshire,	73,366	62,664	15,178
Bulmer,	162,748	135,373	13,760
Birdforth,	108,230	87,345	13,167
Gilling, East,	82,717	74,441	5,046
Gilling, West,	141,735	111,730	5,854
Hallikeld,	64,813	61,762	2,480
Hang-East,	83,576	73,109	13,790
Hang-West,	133,660	112,994	17,435
Langbaugh, East,	151,613	68,804	19,455
Langbaugh, West,	215,990	91,047	57,963
Malton,	56,582	41,796	21,613
Pickering Lythe, East,	69,968	64,982	2,599
Pickering Lythe, West,	52,936	48,514	3,547
Richmond, Borough,	16,499	3,508	26,703
Ryedale,	78,900	71,024	5,012
Scarborough, Borough,	78,157	4,590	64,047
Whitby Strand,	87,973	46,917	45,003
Totals,	£1,669,503	1,160,600	332,652

TOTAL PROPERTY RETURNED IN THE NORTH RIDING IN THE YEAR 1860.

Property returned under Schedule A,	£1,669,503
Property returned under Schedule B,	1,160,600
Property returned under Schedule D,	332,652
Total,	£3,162,755

Increase of Property in North Riding.—The increase in the value of property and profits in the North Riding of Yorkshire, between 1860 and 1869, has not been so rapid as the increase either in the East or the West Riding, and yet it has been very considerable. The North Riding does not possess any great commerce with foreign nations, like that of Hull, which has been growing up into greatness during many hundred years, and has recently taken a new and extended development, under the influence of steam navigation and of a wise and comprehensive commercial policy. Neither does the North Riding possess, at least within its own limits, any of those supplies of coal which have given so wonderful an impulse to the manufactures of the West Riding, during the present century, without which manufactures seem incapable of flourishing in modern

times. Yet the North Riding, in addition to a greatly improved agriculture, and to the finest breeds of horses, cattle, and sheep that exist in England, also possesses a larger amount of rich iron ore than is to be found in any other equal space in Great Britain, rich as this kingdom is in that most useful of all the metals. As we have already stated, the development of the iron mines of the North Riding has been greatly promoted by the proximity of the coal-fields of the county of Durham, which have supplied, in great abundance and at a moderate price, the means of smelting the iron ores of this district. Had it not been for the early formation of the Stockton and Darlington Railway, by which the coal-field of Durham was brought into cheap and easy connection with the trade and commerce of Yorkshire, by means of improved internal transport; and had it not been for the rapid growth of the commerce of Hartlepool, which furnishes large supplies of fuel from another part of the Durham coal-field—the greater portion of the iron ore of the North Riding would have still remained buried in the Cleveland hills. By those admirable means of communication the iron of the North Riding and the coal of Durham have been brought together, under such conditions as fully to develop the benefits of both. This, indeed, is one of the greatest advantages that England possesses over most other countries, as a producer of minerals. The fuel and the ore are in many instances close to each other, and when that is not precisely the case, the admirable inventions of the steam engine and the railway render it possible to bring them together, without destroying their value by the cost of too long a transport. Amongst the greatest results of the railway system has been that it renders it possible to convey heavy articles, like coal and iron ore, ten times as far, at the same cost at which they could be conveyed in former times. From this circumstance the development of the iron trade of the North Riding has been rapid beyond almost all previous example, and from the same cause there will be little difficulty in rendering available any supplies of the ores of iron, lead, copper, or any other minerals which may be discovered in future. As a general rule, minerals are discovered near the lines at which different strata join each other, and in the North Riding of Yorkshire most of the metal-bearing strata come into close conjunction with each other.

The commerce of the North Riding, though to a great extent of recent origin, has increased rapidly during the last twenty years,

and there is no want of good ports to carry it on. Within that time Middlesboro' has become the seat of a great trade, and the principal outlet of the valley of the Tees. During the same period Stockton-on-Tees and Yarm have also increased very rapidly. Further to the south, Whitby, the port of the Esk, has also received an increase of prosperity, from the mineral riches which have been discovered in the interior of Cleveland. Scarborough has also increased with even greater rapidity, from its numerous attractions, and now stands in the first rank amongst English watering places. Along the east coast of the North Riding the fisheries of the German Ocean furnish another source of employment and of wealth.

The increase of property in the North Riding, between the year 1860 and the year 1869, will be seen by comparing the following return for 1868-69 with that of the year 1860, already given:—

ANNUAL VALUE OF PROPERTY AND PROFITS ASSESSED UNDER SCHEDULES A, B, AND D,
OF THE INCOME TAX ACTS FOR THE YEAR 1868, ENDED 5TH APRIL, 1869, IN THE
NORTH RIDING OF YORKSHIRE.

Divisions.	Gross Annual Value of Property Assessed under Schedule A.	Gross Annual Value of Property Assessed under Schedule B.	Net Amount of Profits Charged to Duty under Schedule D.
	£	£	£
Allertonshire,	96,264	72,659	25,020
Birdforth,	137,425	108,648	18,387
Bulmer,	194,562	162,309	18,366
Gilling, East,	93,290	79,060	3,367
Gilling, West,	145,079	125,897	13,124
Hallikeld,	74,816	67,343	3,065
Hang-East,	90,739	78,671	13,945
Hang-West,	139,561	123,786	23,246
Langbaugh, East,	129,626	73,861	80,336
Langbaugh, West,	252,823	95,032	303,149
Malton,	64,011	40,317	31,106
Pickering Lythe, East,	79,838	74,050	2,598
Pickering Lythe, West,	64,300	55,945	7,029
Richmond Borough,	17,247	4,554	26,735
Ryedale,	93,495	81,402	18,391
Scarborough, Borough,	135,422	4,345	100,433
Whitby Strand,	93,954	46,813	49,600
Totals,	£1,902,452	1,294,692	737,897

TOTAL PROPERTY RETURNED IN THE NORTH RIDING OF YORKSHIRE, 1868-69.

Property returned under Schedule A,	£1,902,452
Property returned under Schedule B,	1,294,692
Property returned under Schedule D,	737,897
	<u>£3,935,041</u>

In 1860 the yearly value of property and profits in the North Riding was £3,162,755, showing an increase in 1868-69 of £772,286. The total value of property in all the three Ridings of Yorkshire in the year 1868-69 was £29,181,582.

But great and varied as are the natural resources afforded by the soil and the minerals of Yorkshire, it would have been impossible to develop them, especially in early times, without the assistance given by an abundant supply of water-power for manufacturing purposes, of rivers for the purposes of internal transport, and of ports and harbours for external commerce. In all these respects this county is greatly favoured, and by their assistance it had attained a high position amongst the manufacturing and commercial districts of England, before the power of steam, for manufacturing purposes, was discovered. Even now, although steam has taken the lead of previously existing powers, a considerable portion of the machinery of Yorkshire is impelled by falling streams; whilst navigable rivers and canals still vie with railways in the conveyance of minerals and merchandise. We shall therefore proceed, in the next chapter of this work, to describe the rivers, streams, water-power, and ports of Yorkshire.

CHAPTER IV.

THE CLIMATE, RAINFALL, RIVERS, SEAPORTS, AND
COASTS OF YORKSHIRE.

THE climate of Yorkshire varies greatly in different parts of the county, depending chiefly on the elevation of the land, and the amount of the rainfall, which is much greater in the western than in the eastern parts. From the eastern aspect of the county it is colder in winter, owing to its exposure to the dry, sharp winds of the continent of Europe, than the western districts of England in similar latitudes, such as the county of Lancaster, which face the Atlantic Ocean. On the other hand, the heat of the summer months in Yorkshire, and on the eastern side of Great Britain generally, is greater than it is on the western side of the island in corresponding latitudes, from its being less exposed to the moist winds of the Atlantic. Hence, the wheat and barley grown on the eastern side of the island, both in England and Scotland, generally, as well as in the eastern districts of Yorkshire, are finer in quality and more certain in return than those grown on the west; whilst, on the other hand, the grasses, which generally delight in moisture, are, with equal conditions of soil and elevation, finer in the west than the east, and retain their freshness through the greater portion of the winter months.

The climate of the different parts of Yorkshire varies still more in the quantity of the rainfall, than in the amount of summer heat and winter's cold. The great rainfall of England is along the western side of the island, and more especially along the summits and sides of that range of mountains which is generally known as the Backbone of England. This, as we have stated, extends nearly from the lake district and the borders of Scotland, as far south as Derbyshire, Cheshire, and Staffordshire, and forms the western boundary of the county of York. In the lake district of Westmoreland and Cumberland, where the mountains are nearer to the Atlantic Ocean than in any other part of their course, and where their elevation, is higher by some hundred feet, rising in several cases to more

than 3000 feet above the level of the sea, the rainfall is much the heaviest in England, amounting in wet seasons to seventy, eighty, ninety inches, and in a few narrow valleys of great elevation, lying fully open to receive the immense masses of cloud brought from the Atlantic by the south-western winds, to even upwards of one hundred inches per annum. On the other portions of this lofty range, which rise on the western borders of Yorkshire to an elevation, at their highest points, of 2000 to 2500 feet, and seldom sink below 1000 to 1500 feet, the rainfall is also very great, owing to the large masses of clouds which still discharge their contents on the summits or the higher parts of the mountains. Along this range, on the western side of Yorkshire, the yearly rainfall is often from forty to fifty inches, and at exposed points even sixty inches, which is nearly twice the average rainfall of England. This is the source from which the innumerable springs and brooks of the West and North Ridings, and the numerous rivers which intersect their valleys, draw their never-ceasing supplies. In proceeding inland, from the western range of hills towards the middle of the county of York, the average rainfall diminishes every ten or twelve miles. On the lofty western moors, extending from Settle, Dent, and the hills of Craven to Saddleworth and Sheffield, the average yearly rainfall is from forty-five to fifty inches. Proceeding eastward to Halifax and Huddersfield, the rainfall decreases to twenty-seven or twenty-six inches. Proceeding still further eastward to Leeds, it decreases to from twenty-three to twenty-five inches. And on the eastern limit of the West Riding, the average rainfall diminishes to twenty-two to twenty-three inches. Thus the difference between the amount of rainfall on the hills which form the western boundary of the West Riding and the great plain to which they stretch in the vale of York, varies from fifty to twenty-five inches. There is a corresponding difference in those districts of the North Riding which extend from the western boundary of the county to the vales of York and Mowbray. In the whole of the East Riding, and in that part of the North Riding which lies to the east of the Ouse and Derwent, the rainfall seldom exceeds from twenty-five to thirty inches.

The annual rainfall of Yorkshire, taking the whole county, is not more than the average rainfall of England; but the rainfall of the higher parts of the West Riding is considerably greater than that of England generally. The following are tables of the rainfall

of the eleven districts into which England and Wales are divided, and of the different districts of Yorkshire for the years 1862, 1863, 1864, and 1865; being a sufficient period to give a fair average in the amount of rainfall.

AVERAGE RAINFALL OF THE ELEVEN DISTRICTS OF ENGLAND AND WALES
FOR THE YEARS 1862, 1863, 1864, AND 1865.

	1862.	1863.	1864.	1865.
	Inches.	Inches.	Inches.	Inches.
I.—Middlesex,	26·877	21·133	17·280	23·612
II.—South-eastern Counties,	29·468	26·234	21·754	35·113
III.—South Midland Counties,	24·622	20·234	17·461	28·389
IV.—Eastern Counties,	23·424	18·604	15·690	26·950
V.—South-western Counties,	40·620	38·632	26·859	41·088
VI.—West Midland Counties,	29·645	24·640	21·761	29·874
VII.—North Midland Counties,	23·908	21·338	20·746	25·861
VIII.—North-western Counties,	44·331	43·312	36·569	33·476
IX.—Yorkshire,	30·403	31·656	25·624	27·940
X.—Northern Counties,	53·278	53·899	44·925	41·957
XI.—Wales, &c.,	40·129	39·489	33·274	38·579

AVERAGE RAINFALL AT DIFFERENT POINTS IN YORKSHIRE IN THE YEARS
1862, 1863, 1864, AND 1865.

	1862.	1863.	1864.	1865.	Height of Rain-gauge Above Sea Level.
	Inches.	Inches.	Inches.	Inches.	Feet.
Broomhall Park, Sheffield,	30·87	31·62	24·36	28·69	337
Redmires, Sheffield,	40·96	40·70	31·88	32·47	1,100
Tickhill,	18·76	18·15	19·36	25·26	61
West Melton,	21·99	21·95	19·08	20·04	172
Penistone,	29·09	29·09	24·80	26·73	717
Saddleworth,	43·02	47·94	34·75	33·05	640
Longwood, Huddersfield,	34·08	42·08	24·39	26·08	600
Wakefield,	26·84	25·52	22·59	21·71	115
Well Head, Halifax,	32·22	37·58	23·64	27·96	487
Ovenden Moor, Halifax,	50·00	53·70	38·70	35·00	1,375
Bradford,	33·52	33·52	—	—	370
Manor Road, Leeds,	21·18	23·30	17·04	25·78	90
Eccup,	26·11	25·18	18·95	22·66	340
Boston Spa,	25·63	25·09	23·75	26·54	74
York,	23·11	22·23	21·13	23·19	50
Harrogate,	32·58	34·76	26·48	27·70	420
Settle,	42·77	44·28	32·60	35·38	498
Arnlcliffe,	64·05	66·43	45·78	47·26	750
Beverley Road, Hull,	23·70	24·63	18·27	23·80	11
Holme, on Spalding Moor,	24·17	24·55	21·14	25·16	30
Malton,	26·29	27·84	22·85	23·32	73
Beadlam Grange,	27·95	25·76	29·09	28·55	200
Ganton, Scarborough,	19·83	20·90	23·10	28·35	99*

* The Report of the British Association for the Advancement of Science, Bath, 1864. Report on the Rain-fall of the British Islands, p. 377. Ditto, Nottingham, 1866, p. 288.

It will be seen from the above tables that the amount of rainfall

varies very greatly in the different districts of England, and in different parts of the county of York. These variations appear to depend chiefly on two causes. The first is, that the rainfall is most abundant in those counties or those districts which lie along or near to the western coasts of England, and which thus first receive the clouds of the Atlantic; gradually diminishes in the inland counties; and becomes least in those eastern counties which are furthest from the Atlantic Ocean. There is also another principle shown in these tables, which is, that the rainfall is greatest in those districts in which the land rises highest. From the effect of these two causes united, the rainfall in the mountainous districts on the western borders of Yorkshire, in which most of the Yorkshire rivers rise, is nearly twice as great as that of England generally. Hence the number of streams and of rivers in that district is very great, and the supply of water and of water-power is unusually large. This was the principal cause of the manufacturing prosperity of the West Riding, in times when water-power, and not steam, was the great manufacturing power of England; and it is still a great element of wealth, for manufactures cannot be carried on successfully, even in modern times, without an abundant supply of water.

The Rivers of Yorkshire.—The waters of the numerous rivers which add so much to the beauty of Yorkshire; which spread wealth and create industry, in their progress to the sea; and whose outlets form the most important seaports of this great county — are thus drawn from the evaporation of the Atlantic Ocean, of which the Irish Sea is a great gulf; and from the rainfall produced by the condensation of the vapours of that great ocean. The amount is, no doubt, somewhat increased by the clouds raised by the evaporation of the German Ocean, and carried by the easterly winds into the interior of Yorkshire, where they are discharged on the hills of the East Riding, and the eastern part of the North Riding. But this supply is comparatively small, and only serves to sustain the flow of one considerable stream, namely, the river Derwent. The other streams of the East Riding, and of the eastern part of the North Riding, including the Hull, the Esk, the Leven, and the Wiske, are very small in size, though most of them are remarkable for their picturesque beauty; and one of them, the Hull, has for centuries been the chief seat of the external commerce of the county. The rainfall, which is

the original source from which these and all other streams are fed, does not amount to more than about twenty-five to thirty inches per annum in the East Riding, and as far west as the city of York. Hence, after allowing for the constant evaporation from the earth, in the form of visible or invisible vapour, the quantity of moisture remaining for the supply of brooks and rivers is comparatively small on the eastern side of the vale of York.

But the numerous rivers of the West Riding of Yorkshire, and of the western part of the North Riding, are fed by the evaporation of the Irish Sea and of the Atlantic Ocean. These together form an expanse of water infinitely larger than that of the waters of the German Ocean, and the evaporation of the Atlantic is greatly increased by the Gulf Stream, and the other streams of warm water derived from the tropical seas. These encounter the ocean streams from the icy regions of the north, and fill the air with vapour which rises in the form of clouds. The clouds are borne by the westerly winds against the mountain regions which form what is called the Backbone of England, the western boundary of the county of York. Amongst the rivers which draw their supplies from the rainfall on the western mountains are the river Tees, which forms the northern boundary of the county of York, and discharges its waters into the German Ocean; the rivers Swale and Ure, which join with the river Wiske, flowing from the north-eastern side of the county, to form the river Ouse; the river Nidd, which discharges its waters into the Ouse above York, at Nun Monkton; the rivers Wharfe, Aire, and Calder, which flow into the Ouse below the city of York; the river Ouse itself, which is formed by the waters of the rivers named above, with those of the smaller streams of the Ouseburn and the Foss; together with the river Don and its numerous tributaries, which enter the Humber near to the point where it receives the river Ouse. Much the largest portion of the fresh water which is discharged into the estuary of the Humber, and which principally assists in keeping open the navigation of that great stream and harbour, on which the commerce, not only of Yorkshire, but of the valley of the Trent, depends, is originally brought by the western winds and the clouds of the Atlantic to the mountains on the western borders of Yorkshire, whence it is carried by streams and rivers to the German Ocean.

The rivers of Yorkshire, together with the streams which flow

from the south into the great Yorkshire estuary of the Humber, furnish as great, if not a greater, amount of natural inland navigation than is to be found in any other part of England. The city of York, built by the Britons before the arrival of the Romans, but at once selected by that most intelligent and practical people as the capital of their dominions in this island, owed its chief advantage of position to the circumstance of its being situated at the head of this great natural inland navigation. In the Ouse the lowest tides rise to within a few miles of the city of York, that is, to Naburn Lock, close to Acaster Malbis, the name of which place leaves no doubt that the Romans had a camp and fortress there. York was thus the principal port of a system of inland navigation, extending southward to the river Humber, by the river Ouse, and then still further south by the river Trent to the site of the present town of Nottingham, up the Derbyshire Derwent, to the present town of Derby, and further up the Trent, into what is now Staffordshire. The whole course of the Humber was also connected with this internal navigation, whilst the river Don was navigable to Danum, the modern Doncaster. In addition to the rivers which have been navigable from the earliest ages, the other streams which have been rendered navigable for comparatively large vessels in modern times must always have been useful for floating down cargoes of timber, grain, hides, lead, iron, and other produce, even when they were not regularly used for navigation, up and down the stream. Very little labour has been required to render the river Ouse, and its chief tributary the Ure, navigable as far as Ripon. The Aire and the Calder have easily been made navigable to Leeds and to near Halifax; and in the East Riding, the Derwent has been made navigable as high as Malton. All these rivers must have had great value for the purpose of transporting produce, from the earliest times; and must thus have had their share in developing the prosperity of Eboracum or York, and of the towns and villages which have for ages existed on their banks. At the time when the Domesday book was drawn up in the reign of William the Conqueror, travellers, on their way from London to the north, took boat at Nottingham, and were floated down the Trent into the Humber, whence the tides carried them up the river Ouse to Acaster Malbis, a few miles below York. This great line of internal navigation was at a very early age connected with another, by the Foss Dyke, cut from the Trent in Lincolnshire, at Torksey, to the

Witham, at Lincoln; from which city there was a water communication down the river Witham to Boston, in Lincolnshire, which was then one of the principal ports of the eastern coast of England, and greatly frequented by Flemish and German merchants.

The rivers of Yorkshire flowing from the western mountains are the Tees, the Swale, the Ure, the Nidd, the Wharfe, the Aire, the Calder, and the Don. The chief rivers that flow from the eastern mountains and hills are the Derwent, the Wiske, the Esk, the Leven, and the Hull. These rivers receive a multitude of smaller streams, some of them also described as rivers, but much the greater part of them described as becks, or burns, or brooks. The following is an alphabetical list of the rivers of Yorkshire, showing their length, and the rivers or seas into which they flow. The lengths of the rivers are taken from the Ordnance maps, wherever they are stated on that authority, and in other cases they are approximations founded upon the data supplied by the Ordnance survey. The lengths include the windings of the streams.

THE NAMES, LENGTHS, AND OUTLETS OF THE YORKSHIRE RIVERS.

Names of Rivers.	Outlets.	Length of Course in Miles.	Names of Rivers.	Outlets.	Length of Course in Miles.
Aire,	Ouse,	87	Leven,	Tees,	23
Balder,	Tees,	about 13	Lune (Yorkshire),	Tees,	12 $\frac{3}{4}$
Bain,	Ure,	" 6	Lune (Lancashire),	Irish Sea,	53 $\frac{1}{2}$
Burn,	Ure,	" 10	Nidd,	Ouse,	55
Calder,	Aire,	47	Ouse,	Humber,	59 $\frac{1}{2}$
Colne,	Calder,	about 20	Rawthey,	Lune,	about 15
Cover,	Ure,	" 20	Ribble,	Irish Sea,	61
Dearne,	Don,	26	Riccal,	Rye,	12
Dee,	Lune,	13 $\frac{1}{4}$	Rivelin,	Don,	about 15
Derwent,	Ouse,	72	Rother,	Don,	" 20
Dibb,	Wharfe,	about 10	Rye,	Derwent,	" 25
Don,	Ouse,	68	Seven,	Rye,	" 10
Don (Little),	Don,	about 12	Sheaf,	Don,	" 15
Dove,	Rye,	" 10	Skirfare,	Wharfe,	" 10
Esk,	German Ocean,	29 $\frac{1}{2}$	Swale,	Ouse,	71 $\frac{3}{4}$
Ewden,	Don,	about 12	Tame,	Mersey,	about 25
Foss,	Ouse,	17	Tees,	German Ocean,	95
Foulness,	Humber,	about 15	Thorne,	Don,	about 20
Greta,	Tees,	16	Ure,	Ouse,	61 $\frac{1}{4}$
Greta,	Lune,	13 $\frac{1}{4}$	Washburn,	Wharfe,	about 10
Hebble,	Calder,	about 10	Wharfe,	Ouse,	75 $\frac{1}{4}$
Hertford,	Derwent,	" 15	Wenning,	Lune,	about 15
Hodder,	Ribble,	25 $\frac{1}{4}$	Went,	Don,	" 20
Hull,	Humber,	28 $\frac{3}{4}$	Wiske,	Swale,	" 25
Humber,	German Ocean,	37	Worth,	Aire,	" 10
Laver,	Ure,	about 12			

The area of the county drained by the above rivers is as follows, in square miles :—

Ouse and its tributaries,	4,207
Humber,	1,229
Tees,	744
Ribble,	501
Esk,	136
	6,817

The Becks, Brooks, and Burns of Yorkshire.—The number of small streams which flow down into the Yorkshire rivers is extraordinarily great, and many of them have had a great influence on the development of the manufacturing resources of this county. In fact, in former times almost all that was required to establish one of the small woollen manufactories of those days, was a plentiful supply of water in the neighbouring brook, and a good supply of wool from the downs of the district. It is only in modern times that manufactures have been confined to large towns, and to districts possessed of large supplies of coal. Even now three of the largest manufacturing towns of the West Riding, namely, Bradford, Halifax, and Huddersfield, are situated on brooks and small streams, and not on the principal rivers of the district.

The River and Estuary of the Humber.—The Humber is thirty-seven miles in length, and the area of the country which it drains extends over a surface of 1229 square miles, from the junction of the Ouse and the Trent to the sea. The point of union of the Humber and the river Ouse is at Faxfleet Ness. The average width of the Humber is three to four miles. The area of the country drained by the river Ouse and the streams which flow into the Ouse above its junction with the Humber, is 4207 square miles, which, added to the country drained by the Humber itself, gives an area of 5436, for the country drained into the northern or Yorkshire side of the Humber. If we add to this the country drained into the Humber by the river Trent, and other smaller streams which enter it on the south, the whole area discharging its waters into the Humber is not less than 9550 square miles, or very nearly the fifth part of the area of England. No other river or estuary in England drains so large a territory, not even the Thames. The Humber receives and carries into the German Ocean at least four-fifths of the waters of Yorkshire, and it is a remarkable fact that the greatest port on the eastern side of the island, with the exception

of London, is to a great extent protected from the encroachments of the sands of the German Ocean, by the copious flow of water from the innumerable streams which are fed by the evaporation from the Atlantic, and the rainfall on the western hills. The only good ports on the eastern side of England are those situated at the mouths of great rivers, such as the Thames, the Humber, the Tees, and the Tyne; and those owe their depth of water in a great degree to the scouring of their entrances, by the large amount of water flowing from the interior, and strengthening the force of the receding tides. The Humber is one of the very few rivers of England, which has a sufficient depth of water at its entrance to admit the large ships in which modern commerce is carried on. A fair depth of water continues far into the interior, though winding among sandbanks, and even extends above the Humber into the Ouse, at Goole and Selby. In ancient times, when vessels were comparatively small, even the city of York was returned amongst the free boroughs on the sea, being easily accessible from the sea by the vessels of those early times.

Rise of the Tides in the Humber, Ouse, and Trent.—We have recently obtained very accurate information as to the rise of the tides in these rivers, at the most important points to which the influence of the tide extends. A number of observations were made on the rise of the tides of the Humber, and the rivers Trent and Ouse, in the year 1864, by a committee appointed for that purpose by the British Association for the Advancement of Science. The points at which these observations were made were Hull, Gainsborough on the Trent, Goole, and Naburn Lock, a point on the Yorkshire Ouse, a little below the city of York. The observations at Hull were obtained by the committee from the Dock Company's gauge at that place; those at Goole, from that of Aire and Calder Navigation Company; those at Naburn Lock, from measurements made with the tide-gauge of the commissioners of the River Ouse Navigation; and those at Gainsborough, from measurements made on the town side of the river, about 300 yards below the bridge, by means of a gauge which was procured and erected by the committee to which the inquiry was intrusted by the British Association. The observations at each of the four points were made at intervals of fifteen minutes, and extended over fifty-four tides, commencing at twelve o'clock at noon on the ninth of May, 1864, and ceasing at twelve o'clock at noon on the sixth

of June of the same year. During the whole time in which the observations were in progress, the weather was not unduly influenced by either rain or wind, and therefore the tides were natural and regular. The following were among the points ascertained as to the rise of the fifty-four tides in reference to the zero of each gauge. The mean or average rise of the tides during the fifty-four observations was as follows:—At Naburn Lock, a little below the city of York, 6 feet, 4 inches; at Goole, 11 feet; at Gainsborough, 5 feet 8 inches; and at Hull, 16 feet 3 inches. The highest tides observed showed the following results above zero of gauge:—Naburn Lock, 10 feet 11 inches; Goole, 16 feet 9 inches; Gainsborough, 8 feet 11 inches; and Hull, 26 feet 4 inches. The lowest tide showed the following rise, namely, Naburn Lock, 4 feet 10 inches; Goole, 10 feet 3 inches; Gainsborough, 3 feet; Hull, 20 feet 3 inches. The highest low water above zero of gauge was at Naburn Lock 4 feet 3 inches; at Goole, 3 feet 10 inches; at Gainsborough, 3 feet; and at Hull, 10 feet 4 inches. The lowest low water was at Naburn Lock, 1 foot 3 inches; at Goole, 2 feet 3 inches; at Gainsborough, $\frac{1}{4}$ of an inch; and at Hull, 4 feet 5 inches. The further results obtained from the above observations were, that the mean rise of the tide at Hull in 1862, was 16·95 feet, and in 1864 16·25 feet. In the same years the mean rise of the tides at Goole was 11·67 feet in 1862; and 11·00 in 1864. In the above years the extreme rise of the tides at Hull and Goole were as follows:—At Hull, in 1862, 27·92 feet, and in 1864, 26·33 feet. At Goole the extreme rise of the tides in 1862 was 15·33 feet, and 16·75 feet. These interesting and important figures, showing the different depths of water at Hull, Gainsborough, Goole, and Naburn, which was the ancient port of York, under the name of Acaster, throw a strong light on the causes which have given both its ancient and its modern development to the trade and commerce of the Humber.* In ancient times, when the vessels employed were very little larger than the barges of these days, there was depth of water sufficient to carry them up the river Ouse to Naburn and York, and up the Trent to Torksey, which was then the port of the city of Lincoln. In modern times, when the vessels are of many hundred, and in some cases, of from one to two thousand tons burthen, it requires the depth of water which is found at Hull

* Report on tidal observations made on the Humber and rivers Trent and Ouse, 1864, by a committee consisting of James Oldham, C.E.; J. F. Bateman, C.E., F.R.S.; John Scott Russell, C.E., F.R.S.; and Thomas Thompson. Report of the British Association for the Advancement of Science. 1864. Page 129.

to conduct the great traffic of the Humber with foreign countries. Goole, though not possessed of the same depth of water as Hull, has still sufficient water to have become an important point of communication with the interior, as well as with the continent of Europe, and the coasts of England. This is also the case with Selby, and was in former times with Hedon, Barton, and other places on both sides of the river Humber. But all these in the present age have yielded to the natural advantages, and the great public improvements, of the port of Hull.

The River Fisheries of Yorkshire.—After a long period of neglect, considerable attention has again begun to be paid to the salmon and other fisheries in the rivers of this and other English counties; and a commission, with official conservators, has been appointed to watch over these rivers, with a view of protecting the salmon and other fresh-water fish with which they formerly abounded. This is an object which is difficult to effect in a thickly-peopled district, and perhaps impossible in rivers whose banks are covered with numerous manufactories. Yet there are many reasons, besides that of preserving the breed of salmon and trout, why persevering efforts should be made to save the beautiful rivers of this country from being converted into mere sewers for the discharge of the refuse. There is no doubt that the liquid refuse of towns is itself a very valuable article, and capable of being rendered a great source of fertility; and there are at all events strong reasons connected with the public health why it should not be allowed to become a public nuisance. If we may believe a calculation made in the Report on the Salmon Fisheries of England and Wales for the year 1870, the refuse which is discharged into the rivers of this country, and which is at least useless even when it does not become a nuisance, would, if the whole of it could be applied to the fertilizing of the soil, increase its produce to so great an extent as to enable it to furnish food during the whole year for more than five millions and a half of persons. We are told in this Report that the sewage of the towns of the United Kingdom, which contain in round numbers fifteen millions of inhabitants, would, if properly applied to the soil, produce no less than 3,750,000 additional quarters of wheat, or 7,500,000 quarters of oats; that each quarter of wheat would furnish flour sufficient to make 108 quarter loaves of bread, or in the whole 405,000,000 loaves, a sufficient quantity of bread to feed 5,547,945 persons for an entire year.

Without holding ourselves responsible for these figures, it is impossible to doubt that the refuse of our large towns, properly applied to increase the fertility of the soil, might be rendered a great source of national wealth.*

But it is only in a portion of the West Riding that population and manufactures have increased to such an extent as to render it difficult to keep up the breed of salmon and other river fish, with ordinary attention to their habits and their wants. The power of reproduction, both among river and sea fish, is great almost beyond belief. According to a table given in the Report on the Salmon Fisheries of England and Wales for the year 1870, the number of eggs or germs found in the ovary of a salmon of 12 lbs. weight is 10,000; in a trout of 1 lb. weight, 1008; in a carp of $14\frac{1}{2}$ lbs., 633,350; in a perch of 3 lbs. 2 oz., 155,620; in a jack or pike of 32 lbs., 595,200; in a roach of $\frac{3}{4}$ of a lb., 480,480.† With this wonderful reproduction of the germs of life in our rivers, it is evident that nothing but great carelessness, and a total disregard of the habits and natural requirements of the fish which frequent them, can cause the total destruction of these prolific breeds in any rivers in which the waters are pure enough to sustain life. Yet in many English rivers, including some of those in this county, the salmon and other river fish have been nearly destroyed, although some progress has been made towards their restoration, owing to the efforts made with that object during the last ten years. In the account which we are about to give of the rivers of Yorkshire we shall bring together such facts as are necessary to show the natural advantages of the several streams for the breeding of salmon and other fish, and what is necessary again to fill them with the beautiful and useful creatures which formerly occupied their waters in incalculable numbers.

The Fisheries of the Humber.—The Commissioners on the Salmon Fisheries of England (1861) make the following observations respecting the fisheries of this magnificent estuary in their Report, page 5 :—“The estuary of the Humber, from thirty to forty miles in length, and averaging a breadth of from three to four miles, drains the largest basin in all England. On the one side, the Ouse and its

* Salmon Fisheries (England and Wales). Ninth Annual Report of the Inspectors of Salmon Fisheries (England and Wales); presented to both Houses of Parliament by command of Her Majesty, p. 35, 1870.

† Report of Salmon Fisheries (England and Wales), 1870, p. 54.

large tributaries, and on the other the Trent, flow conjointly from an area of 9550 square miles. The estuary is nearly unobstructed by fixed engines, and a very large body of fresh water is at all seasons poured into it from the two main feeders already mentioned. But these rivers, for a considerable way inland, are deficient in the requisites for salmon, being sluggish in their course, and the Trent in many parts during summer is much choked up with weeds. The upper parts, however, of nearly all the tributaries into which these rivers branch out, are rapid, and afford a large extent of excellent spawning-ground. In these, salmon were formerly plentiful. Some of the Yorkshire rivers have suffered greatly from the effect of manufactures, and the salmon are nearly gone; but a few still find their way to the upper waters. The condition of the Trent is rather better, notwithstanding the sluggish and weedy character of the lower parts. In spite of the disadvantages which now attach to them, these large rivers, with their unobstructed estuary, are well worthy of attention, and if a free passage were opened through them, the fisheries would be of great value."

The River Ouse.—There are four rivers of this name in England; namely, the great Ouse in Cambridgeshire, Huntingdonshire, and Northamptonshire; the Little Ouse, which flows out of Norfolk; the river Ouse in Sussex; and the Ouse, the great receptacle of the rivers of Yorkshire. The Yorkshire Ouse, of which we now speak, is fifty-nine and a half miles in length. The area of its catchment basin is 4207 square miles from its commencement, at the junction of the Swale and the Ure, to the point where its waters are lost and mingled with those of the Humber. In the whole of its course it flows through a wide and fertile plain. Its course is slow and tranquil, compared with that of most other Yorkshire rivers. It is navigable through the whole of its course, the inland navigation commencing at Ripon in the Ure, which is one of its chief tributaries, and extending by Boroughbridge and Aldborough to York, Selby, and Goole, to the Humber.

The river Ouse commences below Swale Nab, at the junction of the rivers Swale and Ure, near which point it also receives the burn, or brook, known as the great Ouseburn, which no doubt has taken its name from the river, although by some it has been supposed that the river had been named after the burn, or brook, which is at least highly improbable.

The river Ouse, after collecting the waters of the Swale, the Ure,

and some smaller streams, flows southward by Linton-on-Ouse, where the waters have been deepened by the erection of a weir. Thence it passes Newburn-on-Ouse and Beningbrough Park to Nun Monkton Park, where it receives the waters of the Nidd. These flow down from the western moors by Pateley Bridge, Ripley, Knaresborough, and Kirk Hammerton, into the river Ouse. From the junction of the Nidd the Ouse flows, with a somewhat wider stream, on to Overton, Nether Poppleton, the new water works, and Clifton, to the ancient city of York.

The Ouse flows through the ancient and famous city of York, the capital of the county, which owes its long-continued prosperity, and perhaps its existence, to the advantages afforded by the navigable streams of the Ouse and its tributary the Foss, the latter of which streams is seventeen miles in length and navigable for small vessels. Below the city of York the river flows through Fulford and Middlethorpe to Bishopthorpe, the ancient residence of the archbishops of York. There the depth of water is somewhat increased by the Naburn lock and weir; and Naburn lock is the point to which ordinary tides flow up the river Ouse. Close to Naburn lock is Acaster Malbis, no doubt a Roman station, formed at the head of the tide water of the Ouse. From Acaster the river Ouse flows down by Moreby Park, Hales Hill, and Escrick Park, to Cawood, near which it receives the river Wharfe from the west.

From the junction of the Wharfe the river Ouse flows down by Riccall, which is mentioned in the Anglo-Saxon Chronicle as one of the landing places of the Danish invaders, in the reign of King Harold. Thence the stream becoming wider and deeper, and bending eastward, flows on to the ancient town of Selby, and the modern port of Goole, situated in the parish of Snaith. Near Goole the river Aire, bringing with it the waters of the river Calder and of numerous smaller streams, joins the river Ouse. In the same neighbourhood, but on the opposite side of the river, the river Derwent joins the Ouse at Derwentmouth near Barmby, bringing down with it much the larger portion of the waters of the East Riding, and of that part of the North Riding which lies to the east of the vale of York.

Not far from its junction with the Aire and the Derwent, the artificial course of the Don, known as the Dutch River, enters the Ouse, conveying the waters of the Don, the Dearne, the Rother, the

Sheaf, and the almost innumerable streams and brooks of the south-western district of Yorkshire. From that point the Ouse flows on with an easterly course to Faxfleet, where it joins and mingles its waters with those of the Humber:—

The Salmon Fishery of the River Ouse.—The following evidence with regard to the salmon fishery of the river Ouse, and of those of its tributaries which do not flow through the manufacturing districts of the West Riding, but preserve their waters in their native purity, was given at York on the 7th November, 1860, before Sir William Jardine, Bart., chairman, and J. W. Ffenell, and G. K. Rickards, Esqs., commissioners appointed to inquire into salmon fisheries for England and Wales. The first witness examined was Thomas Ashworth, Esq., an extensive owner of salmon fisheries both in England and Ireland, who gave the following evidence as to the natural advantages of the river Ouse for salmon fishing. We quote his views from page 395 of the evidence taken before the commission.

“Question 13,339 (Chairman). Where do you reside? in Yorkshire? At Poynton in Cheshire.

“13,340. Do you know Yorkshire? I have an estate at Selby, and a fishery upon it.

“13,341. Do you know the rivers of Yorkshire? I know something of them.

“13,342. Will you be good enough to state what you know of the salmon fisheries in the Yorkshire district? I own a salmon fishery on the Ouse at Selby, and my brother and I have another in Ireland. The fishery of Selby produced a rent of £2 this year; but for five previous years I think I only got a rent of one salmon each year. From the best information I have been enabled to collect, there appear to be about fifteen places on the Ouse between York and the Humber, at which salmon are caught, and the rent for these fishings amounts, to £122 15s. The witness read the following list:—

OUSE RIVER.	FISHERY RENTS.		
	£	s.	d.
Linton Lock Fishing, about,	10	0	0
Naburn Lock, West side, Mr. Etherington's tenant,	50	0	0
Ditto, East side, Mr. Leaf,	25	0	0
Wharfemouth, John Turner,	5	0	0
Cawood Fishing,	2	0	0
Cawood, three or four fishings, J. T. Lund,	10	0	0
Cawood, William Varley,	4	10	0
Hemingborough Landing Fishing,	1	0	0
(There are fishings below, but they are fished by the owners, no rent.)			
Roman's Farm to Newing Ferry Fishing place,	4	0	0
Roman's Farm Fishing,	2	10	0
Barlby Bank, Selby,	2	0	0
Wistow Fishing,	2	10	0
Barlby,	1	15	0
Turn head Fishing place, rent,	2	10	0
Total,	£122 15 0		

"In connection with that list I may add that H. Rudston Read, Esq., fishes part of the Derwent, a tributary of the Ouse, but only caught three fish this year. Lord Wenlock has part of the Derwent, but he does not sell the fish. Salmon go up to Stamford Bridge on the Derwent, and the miller there catches a few at his own weir; and there are two locks for vessels to pass through below that weir. I could not ascertain that any fish passed the miller's weir. I calculate there are upwards of 600 miles of river and tributaries flowing into the Ouse, including the Derwent, from agricultural districts of upwards of 900 square miles. I have not taken the small tributaries, but only such as I could find upon a large map. If I had taken them more minutely, I have no doubt that the extent of salmon breeding ground would have been vastly increased. I have divided the county into two districts; the upper district we will assume to take in the river Derwent, and to extend to within a few miles of Wetherby. Then, next to the Derwent, I take the river Wharfe—which is on the opposite side, that extends to the hilly districts in the north of Yorkshire; and in continuation of that we will take the Ouse, with the Swale, the Ure, the Nidd, and all the various tributaries in that system. Most of those rivers, to my own certain knowledge, are as pure from adulterations and foul water, or anything of that kind, as most of the rivers in either Ireland or Scotland. The southern part of the county—that is, a considerable portion of the West Riding of Yorkshire—is embraced within the rivers Aire, the Calder, and the Dun; and all that district extending from Settle, in the north, down to Keighley, Leeds, Halifax, Huddersfield, Wakefield, Barnsley, Pontefract, and so on, down until it joins the river Humber. In order to simplify the thing as far as possible, in any calculations I have made I have omitted the whole of that series of rivers as being to a certain extent impregnated with foul water; and therefore, what I have to deal with is the upper district. I have estimated the rivers that I have endeavoured to describe, arising from the district, as 900 miles; and I attribute the small produce of those rivers to the weirs, placed across them, which prevent the fish from ascending to the small streams, where alone they can safely deposit their spawn. The Irish fishery law prohibits nets from being placed across a river, and enables parties to erect salmon ladders over all weirs, and to protect the salmon from poachers at all seasons, and to remove all natural obstructions from the beds of rivers; whereas, in this country, we find permanent mill weirs placed across rivers without the possibility of the fish ever passing over them; and we know that salmon spawn deposited in the lower parts of a muddy river like the Ouse must perish, and the species become extinct, unless the fish can ascend to the small tributaries, or to beds of gravel, where the water is not deep, and is pure, and beyond the reach of their natural enemies. The young fry cannot exist in deep pools; they must have air; and this can only be obtained in small streams of pure water, say, six inches in depth. I proved this by hatching salmon ova in garden wells, where I have seen scores of them die in a day in a stream of pure spring water only eight inches in depth, with a constant amount of pure water passing through it, arising from the want of air. The young fish in its early stages is about half an inch in length, and is so constructed that it cannot swim any great distance; it can only get air, which is indispensable to its existence, by coming to the surface, which they cannot do in a deep, muddy river, such as the Ouse. Unless they can rise to the surface of the water for air they must be drowned, and from this circumstance all the young salmon produced in deep water must die; besides which, they are liable to be carried away by heavy floods into deep pools, where they perish, if they are not devoured by larger fish.

"Salmon are very prolific, and for every pound in weight the parent fish produces a thousand ova. I conceive, if similar laws and appliances could be brought into operation in England that are now in use in Ireland, our rivers would become equally productive. The Irish Fisheries Commissioners, in their report of 1857, state that the value of the salmon caught in Ireland is £300,000 and more annually, whereas in England I have never seen any calculation that made the annual produce amount to £10,000 in value. We have in England and Wales about one-fourth part more rivers in extent than there are in Ireland; consequently it is reasonable to assume that the English rivers may become equally productive, with similar laws and appliances. I may state that in our own fishery in Ireland I have had

salmon ladders made over all the mill weirs; and I have had natural obstructions, rocks and waterfalls, made accessible to the salmon, over which they had never before been able to pass; and thus, with protection to the fish, the quantity has increased to at least nine times the number that existed previously. These ladders are simple in construction, and not very expensive, and they enable the salmon to pass over any weir without the loss of any mill power, or injury of any kind to the proprietors of the mills. It is during the time when there is surplus water, and during floods, when the miller does not require the water, that the salmon migrate; and by placing a board on the top of a weir four inches in height, and leaving an opening of eight feet wide at the entrance into the stairs, you obtain a current of water through the stairs of eight inches in depth, and this enables the fish to get up at all times when there is any surplus water. By means of similar contrivances, I see no reason why many of the English rivers should not become equally productive with those in Ireland and in Scotland. I have only four things to state: two of those are in reference to salmon fisheries in Scotland, and two in reference to salmon fisheries in Ireland. By calculation we find that the river Shannon contains an area of 7200 square miles, and produces salmon of the annual value of £80,000. The river at Waterford contains an area of 4000 square miles, and produces salmon of the annual value of £40,000. Then I will take two Scotch rivers. The river Spey, as proved by the duke of Richmond, produces a net annual income of more than £12,000 a year, and it contains an area of about 1050 square miles. The river Tay contains an area of 2800 square miles, and produces salmon which I estimate of the annual value of about £30,000, the fishery rents this year having been increased to £14,000. The river Ouse and its tributaries contains an area of 2400 square miles, and probably produces salmon of an annual value of about £400, the rent, as I have shown, being £122 15s." (The witness produced and explained a model of a salmon ladder, and also a plan for a ladder by Mr. Roberts, the engineer of the Board of Works in Ireland).

Having given a brief sketch of the Humber and the Ouse, which are the great receptacles of the waters of Yorkshire, we proceed to describe the numerous streams that flow into them from the west, the north, the east, and the south. We shall commence with those that flow from the western hills and mountains, being the most numerous and the most abundant in their supplies of water; and along with them we shall describe the streams which enter the Ouse from the north. Afterwards we shall give a sketch of the streams which enter the Ouse and the Humber from the south and east. We shall then describe separately the Yorkshire streams which do not discharge their waters either into the Ouse or the Humber, beginning with those which flow into the Irish Sea, and concluding with those that discharge their waters into the German Ocean.

The River Swale.—The river Swale, the first great tributary of the Ouse, is formed by the union of numerous becks, or brooks, rising in the high crescent of moorland described in the last Geological Survey of Yorkshire as Birkdale Common, Angram Common, and Ravenseat Moor, and sweeping from Water Crag, by Nine Standards, Fell End, High Seat, Lady Pillar, and Shunnor Fell. These flow down from the western mountains through

deep gills or ravines, and unite at the head of Swaledale. Most of the mountains from which the waters of this river flow, are of the height of more than 2000 feet. Amongst them are Stoneybank, at the head of Long gill, 2224 feet high; High Seat, at the head of Brockholes gill, 2327 feet; and Lodge Hags, at the head of Uldale gill, 2100 feet. The range of mountains, of which these are amongst the highest points, separates the waters which flow into the rivers Eden and Tees, from those that flow down Swaledale, into the river Ouse. The summits of the mountains at the head of Swaledale belong to the millstone-grit formation, and display the wild and barren moors which form its usual scenery, whilst in the valley the Yoredale rocks and upper limestone shales present grassy pastures on the surface, and numerous veins of lead beneath. The lead-mines of this district form its principal natural wealth, and are worked to a considerable elevation amongst the mountains and hills, as they have been for many hundred years.

The river Swale is formed chiefly by the two large streams named Sleddale beck and Birkdale beck, which join their waters at Stonehouse, near Lane End lead-mines. Flowing east, it receives the Whitestundale beck from the north, near the Little Moor Foot mines, and rather lower, the Stonesdale beck. Each of these streams rushes down a deep ravine, and after heavy rains they pour great floods of water into the river Swale. Below the junction of Stonesdale beck the valley begins to widen, and at Muker, Swaledale assumes the form of a winding valley, watered by a bright and lively river.* Muker is a market town, small in size, but much frequented by the mining population at its markets and fairs. In the descent of these streams from the mountain tops and sides, numerous rapids and several small waterfalls are formed, some of which are very beautiful, especially after the heavy rains which turn every brook into a mountain torrent.

From Muker the river Swale flows by Gunnerside to Reeth, which is the principal town in this neighbourhood, and the chief place of the mining district. Reeth stands near the point where Arkle beck pours into the Swale, a stream which, after heavy rains, is not much less abundant than its own. The town is situated about half a mile above the conflux of the Arkle with the Swale, upon an eminence sloping to the south-east, and presenting many beautiful and highly picturesque views. It is the capital of the mining

* Ordnance Survey of Yorkshire, 1847-1853.

districts of Swaledale and Arkengarthdale, and has also a manufacture of knitted stockings, for which these dales have always been famous. To the west of Healaugh are the remains of a mansion, which is said to have belonged to John o' Gaunt, duke of Lancaster, who, as earl of Richmond, was lord of all this valley.

Below Reeth the valley opens, though still bounded both to the north and the south by rugged hills and cliffs, rising to the height of 1000 to 1500 feet. At Grinton, which is the most ancient parish of Swaledale, the river winds round the parish church and an ancient camp, probably of British or Roman origin, and soon after passes the monastic ruin of Marrick Priory, on the north side of the river, and Ellerton Abbey or Priory, on the south side of the stream. Some Roman remains have been found at Fremington, near Reeth, although the great line of Roman communication, from Eboracum to the western end of the Roman wall, was through the valley of the Tees, and not through that of the Swale. Flowing past Marske, the ancient seat of the Huttons, with its deer park and its extensive woods, it is there joined by Marske Brook. Below Marske the river Swale flows through woods and inclosures to Whitcliffe paper mills, and thence to Richmond, with its ruined castle, built in 1071. This ancient feudal fortress rises on the north bank of the Swale, and the town of Richmond, so named by its Norman lords from the beauty of its situation, stands at the foot and on the sides of the neighbouring hills. In ancient times this was the seat of a most powerful earldom, known by the name of Richmondshire, and extending over the north-western portion of Yorkshire, the two northern hundreds of Lancashire, and the southern part of Westmoreland. It is a place of great historical interest, and no doubt derives its name, the Rich Mount, from the richness of the scenery amongst which it stands. We shall trace the history of Richmond in a subsequent part of this work. Behind the town the race-course extends over a lofty plain, at a height of 847 feet above the level of the sea, commanding magnificent views of the surrounding country.

From Richmond to Catterick Bridge, the river Swale winds through a green valley, whose sides are covered with numerous remains of antiquity, most of them formed by the ancient earls of Richmond. A little below the town are the remains of Easby Abbey, and near Brompton-on-Swale the remains of St. Giles' Hospital. On the high grounds to the south of the river is Brough

Hall, the seat of Sir John Lawson, Bart., in an extensive well-wooded park. We shall describe this and the many other noble mansions of Yorkshire in the second volume of this work: our present object is to trace the course of the Yorkshire rivers. Between the hill on which Brough Hall stands and the Swale, is the old Roman station of *Cataractonium*, which was a British town in the time of the Brigantes, and is mentioned by Ptolemy as *Katarakton*. Catterick Bridge, a little lower down the river, has superseded the ferry by which the Romans crossed the stream. The line of the Roman road can be traced for many miles, both on the north and south side of the river Swale. To the south it corresponds very nearly with the well-known course of the great northern road, known as Leeming Lane; and north of the Swale the Roman road, there known as High Street, runs between Gilling and Sedbury Park on one side, and Middleton Tyas and Middleton Lodge, to the banks of the river Tees.

Below Catterick Bridge the river Swale loses all appearance of a mountain stream. Between its sources and Catterick Bridge it flows with extreme rapidity over a rocky bed, and falls more than 1000 feet in a course of about thirty miles. At Catterick Bridge the Swale reaches and flows gently across the new red sandstone formation, and the vales of Mowbray and York, which are nowhere much more than 200 feet above the level of the sea. In passing down this great plain it leaves Hornby castle and park, the residence of the Osbornes, dukes of Leeds, on the right; also Kiplin Park, recently the seat of the earls of Tyrconnel, but now belonging to the ancient house of Talbot, the Hon. Walter Cecil Talbot having taken the name of Carpenter, on succeeding to the estate in June, 1868; and Baldersby Park, belonging to Lord Downe. From this point to the neighbourhood of Boroughbridge the stream has cut its way, with innumerable windings, through the soft soil. From its source to Catterick Bridge the general direction of the river Swale is from west to east. From that point it flows in a south-easterly direction, until it strikes the Lias formation at Topcliffe, by which its course is turned almost due south, to the point at which it joins the Ure to form the river Ouse.

In its course south-eastward through the plain of Mowbray the Swale winds through a very fertile grassy country, and receives Grimsar beck, flowing down from Bedale and the hills, of no great

elevation, which separate the southern part of Swaledale from Yoredale. Near Breckenborough the Swale receives the river Wiske, which rises in the Cleveland hills near Ingleby Arncliffe, and flows down towards the vale of York. The streams that flow from the northern side of the same hills run into the river Tees, and those which flow from their eastern side discharge themselves, through the valley of the Esk, into the sea at Whitby.

Near Topcliffe, where there was an ancient castle of the Percys, earls of Northumberland, the river receives a considerable stream, known as the Coldbeck or Codbeck, which rises in the Osmotherley moors, and flows down by Thirsk, into the Swale. Here the high and rising grounds turn the course of the Swale to the south and west. Leaving the edge of the Hambleton hills, the Swale flows through a comparatively level and very fertile country, to Myton-on-the-Swale, a little below which place it joins the river Ure, and takes the name of the Ouse. The name of the Ouse, like those of the Wisk, the Esk, and the Usk, is probably derived from the very ancient Gaelic word *uisg*, which simply means "the water," and gives name to many English streams, including several large rivers.

The geological formation of the country watered by the river Swale is as follows:—The numerous brooks or becks which unite to form the Swale, rise in lofty mountains of the millstone-grit formation. Its course, from the point where it becomes a single stream down to the town of Richmond, is over the carboniferous rocks known as the Yoredale rocks, or upper limestone shale. Between Richmond and Catterick Bridge it flows for a short distance over the millstone grit. Below Catterick it enters the great Yorkshire plain, and flows over the New Red or Trias formation, bending round a projection of the Lias formation at Topcliffe, and joining with the river Ure to form the river Ouse at Aldborough.

The water-power of the river Swale is very considerable, though somewhat liable to be interrupted by floods in the winter months, and by drought in summer. It is chiefly used in working corn mills, and in preparing the lead ore in the higher part of Swaledale. From the great distance of the district traversed by the Swale from the sea, the water-power has never been much used for manufacturing purposes. There is no coal at present worked in any part of the country over which the river Swale flows. But, within the last few years, it has been thought worth while to search for coal both in the neighbourhood of Thirsk and Northallerton,

which are the principal towns in this district. Hitherto, however, the trials have not been successful.

The River Ure.—The river Ure, the second great tributary of the Ouse, rises in the mountains on the western border of Yorkshire. Ure Head, the spring or source from which it flows, is on the summit of Abbotside Common, at an elevation of about 2186 feet above the level of the sea. The rill, which forms the commencement of the river, winds rapidly down the side of the mountain, descending more than 1000 feet in the first two or three miles of its course. It runs parallel with the ancient road across the mountains, known as the Highway, down the valley; and leaving the moors of Abbotside Common to the north, and those of Widdale Fell to the south, it flows past Shaw Paddock Inn (1137 feet), to Lunds Church and Ure force. Passing Appersett Scar, the Ure receives the brook of Cotterdale from the north, near Holme Heads Bridge. Thence it flows down to Hawes, the highest town in the valley, receiving numerous becks from the right, and Hardraw beck from the north. Hardraw force, on the latter stream, is a fine waterfall, springing at a single leap ninety-nine feet, from a limestone ridge into a rocky basin, whence the waters flow down rapidly into the river Ure. Cottar force is also another pretty waterfall on the stream of the same name, which flows down from Shunnor Fell and Lovely Seat. One great charm of the principal waterfalls of Uredale and Wensleydale is that they are nearly all overshadowed or fringed by luxuriant trees, shrubs, or creepers issuing from the crevices of the mountain-limestone rocks, and giving softness to the scenery of the wildest fells.

Wensleydale commences to the east of Hawes, and follows the windings of the river Ure. The situation and the scenery of Wensleydale are delightful. It stands at an elevation of about 900 feet above the level of the sea; but the soil resting on the limestone is generally fertile, and the dale is sheltered by a long ridge of hills, alternately wood and rock, on the north. Rising gently above the banks of the Ure, it presents a plain of great fertility, beyond which an irregular and pleasing tract of cultivated grounds, woods, and pastures, rises before the eye, and terminates in the bold and purple form of Penhill to the south. Up the valley the landscape is at once soft and magnificent, and the opening of Bishopdale when it falls into the vale of Ure, affords by its depth and mountain character a fine contrast to the more open part of Wensleydale.

Near Hawes there is another fine waterfall, named Gale force; and about four miles below Hawes, at Bainbridge, the Ure receives a considerable stream, dignified with the name of the river Bain, which discharges the overflow of Simmer Water—a large tarn, or small lake, formed by the waters of several mountain streams. Near the junction of the Bain with the Ure is the site of Foss Abbey, the oldest monastic house in this valley.

Below Bainbridge, at Brough Hill, are the remains of a Roman camp, which is supposed by Camden to have been known to the Romans as *Bracchium*. The outline of the camp is very clearly traced, but there is some uncertainty as to the name and the position.

The river Ure flows down a grassy, well-wooded valley, to Aysgarth. The falls or forces of the streams which descend from the hills, and enter the river Ure near Askrigg, are amongst the most beautiful in Yorkshire. They are three in number—namely, Bow force, a pretty cascade, twelve feet in height; Millgill force, sixty-nine feet in height, and presenting a noble mass of water; and Millgill upper force, forty-two feet in height. We shall give a detailed account of all these beautiful objects in our description of the hundreds or wapentakes in the second volume of this work. Our present object is to describe the Yorkshire rivers as a whole.

At Aysgarth the river Ure itself rushes through a narrow pass, presenting a magnificent fall of waters, especially after heavy rains. The rapids of the Ure at Aysgarth are beautiful at all times, and when the river is flooded they are magnificent. The waters are at first collected by a weir, and afterwards turn Aysgarth Mill, Thence they rush down rapids, winding at the foot of a lofty scar or rock. There are three waterfalls or forces in rapid succession. The first is High Force, below which are Yore bridge and mill. Then comes the Middle force; and lower down the stream is Aysgarth force. The valley through which the river winds is richly wooded, and lined with rocks.

Flowing eastward, from Aysgarth, the river Ure receives the waters of numerous streams down Bishopdale. It then flows eastward to Bolton Hall and Castle, and the village of Wensley, which gives the name of Wensleydale to this beautiful valley.

Bolton Castle in the parish of Wensley, was built by Richard Lord Scrope, chancellor of England in the reign of Richard II., was

one of the places of captivity of Mary Queen of Scots, and was bravely defended by the royalists under Colonel Scrope in the great civil war. From neglect and from the damage received during the siege, the tower on the north-east angle became so much injured that it fell to the ground in the year 1761. But three of the four towers are in good repair, and Bolton Castle is still one of the noblest buildings in Yorkshire.

Bishopdale is in the parish of Aysgarth, about six miles below Askrigg. The township consists of farm-houses scattered at irregular distances, and in this picturesque and fertile dale there are several cascades of great height, and vast ledges of rocks intermingled with rich foliage. An account of the cultivation and the recent improvements in all these dales, will be found in the third chapter of this work.

At Middleham the river Ure receives the river Cover, which flows down Coverdale, rising amongst the hills which separate Wharfedale from Wensleydale. Nearly opposite to the junction of the Cover with the Ure is Danby Hall, the mansion of the ancient family of the Scropes, who for ages were lords of this district, but who forfeited a considerable portion of their vast estates for their loyalty to King Richard II., when he was dethroned by Henry Bolingbroke, afterwards King Henry IV.

Middleham in Wensleydale was the principal castle of the De Nevilles, earls of Salisbury and Warwick, and one of the most celebrated of the old baronial houses of Yorkshire. The castle, which was formerly of very great strength, is still an extensive and interesting ruin, and it is surrounded by eminences which were evidently fortified in ancient times. Middleham is now chiefly famous as the principal training place for Yorkshire race-horses.

Leyburn is about four miles from Middleham. The soil is generally very fertile, and the town pleasantly situated. The walk called Leyburn Shawl, which passes along a continued ridge of limestone rocks overlooking the river Ure, is one of the finest natural terraces in Great Britain.

From Danby Hall, near Middleham, the Ure flows down to Jervaulx Abbey, formerly one of the most magnificent monastic houses in Yorkshire, but now a small though picturesque ruin. Below this point the Ure winds with an eastern course to Kilgram Grange, where it begins to bend towards the south, flowing by Squirrel Bank nearly due south to Highmains, where it suddenly bends, and with

several curves winds round the woods of Clifton Castle. From this point the river flows through well-wooded banks, nearly due south to Masham, and about a mile below that town receives the river Burn. The town of Masham is delightfully situated on the banks of the river Ure, and the adjacent country, particularly to the east, where the land lies on magnesian limestone, is very fertile. To the west the country rises into extensive moors and wilds; Masham Moor, as it is called, extending over nearly 10,000 acres of land. The Swinton estate, with Swinton Park, are within a mile of the town; and the highly picturesque grounds extend from the vicinity of Masham to the margin of the moors, large tracts of which were reclaimed by the late William Danby, Esq., and belong to the estate of Mrs. Danby Harcourt.

The river Burn rises in the Great How on the wildest part of Masham Moor, and receiving numerous tributaries, flows down by Healey to Fearby Moor, then along the north side of Swinton Park to the village of Swinton, and thence to the Ure, which it enters near Aldborough Hall, one of the residences of the ancient family of Hutton.

After receiving the waters of the river Burn, the Ure winds round a lofty height named Nutwith Cote, at the top of which are two tumuli. Thence it flows down to Hackfall, one of the most beautiful scenes to be found even in Yorkshire, the river winding at great depth over dark rocks, through thick woods of oak, from which it is supposed by some that the name is taken. The grounds of Hackfall extend from the ancient village of Grewelthorpe down to the river Ure, and then follow the windings of the latter stream. From the high grounds in this neighbourhood there are most magnificent views, extending over the vale of York, and including the city and cathedral.

After passing the woods of Hackfall the river Ure winds round by Mickley down to West Tanfield, where there is a fine bridge across the river, connecting the North with the West Riding. At Tanfield there are the ruins of an ancient castle, which formerly belonged to the Marmion family, but has been in the possession of the Bruces, marquises of Aylesbury, since the time of James I. Near Tanfield the river, which has flowed over the millstone grit or the mountain limestone from the commencement of its course, enters upon the magnesian limestone, and follows the line of that formation down to the city of Ripon, the scenery being everywhere very beautiful. In this part of its course the river touches the

grounds of Norton Conyers, an ancient residence of the Norton family. Thence it flows nearly due south to Hutton Conyers; and then with several windings, and leaving the episcopal palace on the right, down to the city of Ripon, both in ancient and modern times the seat of a bishopric.

At Ripon, the river receives the waters of the Skell, a small stream flowing down from the western hills, and passing round the beautiful scenery of Studley Royal, the seat of the earls of Ripon; near Grantley, also, is a seat of the Nortons, Barons Grantley.

The river Ure has been made navigable by art from Ripon down to the point where it joins the river Ouse. After passing the city of Ripon, it flows with a south-east course till it comes opposite the ancient mansion of Newby Hall, the scene of a terrible catastrophe, in which Sir Charles Slingsby and several other gentlemen belonging to a hunting party lost their lives in attempting to cross the Ure after heavy rains. From Newby the river flows eastward by Roecliffe until it reaches the ancient town of Boroughbridge, where the bridge across the stream was in ancient times considered a military position of great importance. Here also stands, about a mile from the river, Aldborough, supposed to have been the *Isurium* of the Roman Itineraries, and the capital of the Brigantes. Numerous remains of antiquity are found in this neighbourhood, which will be described in a subsequent part of this work. After passing Boroughbridge the river winds by Ellingthorpe Hall and Ellingthorpe Ings, or meadows, down to Swale Nab, where it receives the waters of the river Swale. These united streams form the river Ouse, the course of which has been fully described in this chapter.

The geological formation of the country traversed by the river Ure is as follows:—It rises on the edge of the millstone grit and Yoredale rock, or upper limestone shale, and runs over the carboniferous limestone in the beautiful Wensleydale. Below Clifton Castle it flows for some considerable distance over the millstone grit, and then along the magnesian limestone to Ripon, and nearly to Boroughbridge; but before reaching the latter place, it enters the great red sandstone plain. This it flows over until it joins its waters with those of the Swale, to form the river Ouse.*

The river Ure runs from north-west to the south-east. Its course down to Middleham is very nearly from west to east. There, however, it suddenly bends to the south, and continues its course

* Ramsay's Geological Map of England and Wales.

southward, over the magnesian limestone, through Ripon. Thence it flows east by south to Boroughbridge and the junction with the river Swale.

Fisheries of the Ure and the Swale.—In the inquiry into the state of the salmon fisheries of Yorkshire, in the year 1861, the following evidence was given by Mr. Cayley (who then represented the North Riding), and John Hutton, Esq., of Aldborough Hall, as to the natural capabilities and the actual condition of the Ure and the Swale as salmon-fishing rivers. Mr. Cayley also spoke of the condition of the river Rye, one of the largest and most beautiful tributaries of the Derwent.

Edward Stillingfleet Cayley, Esq., M.P., gave the following evidence :—

“13,605. (Chairman.) Have you any observations to make upon the subject of this inquiry? I am no fisherman, but I happen to live near the head of the Derwent, and I can state from my own knowledge that it has the same characteristics which the witnesses have described in respect to the Rye. It rises in moors; it is a perfectly pure stream; it has a gravelly bed for many miles; and there is a fishing club towards the head of the stream, at a place called Ayton. To all intents and purposes, I think it has all the same facilities for spawning as the Rye would have. The Derwent is also a trout and grayling stream, and the grayling, if anything, preponderate; they get to a large size. The trout are certainly a less size than they are in the Rye. With reference to the Ure, I have, as representing the North Riding, where the tributaries of the Ouse principally exist, made some inquiry as to the Ure and the Swale. I have a letter from Mr. Lawson, who lives near Ripon, at Aldborough, who says that salmon come up in large shoals annually to spawn in the Ure, and there is no reason at all why they should not do so in the Swale. The only difficulty in regard to the Swale is that there are lead works, which may to a certain extent poison the water.”

John Hutton, Esq., of Aldborough Hall, gave the following evidence with regard to the fishery of the river Ure :—

“13,642. (Chairman.) Where do you reside? At Aldborough Hall. I was requested by Lord Bolton to state that he should have been here to-day, but was obliged to leave home for London. His lordship takes very little interest in the river, because, owing to Naburn lock, the fish cannot get up above Ripon. When there is a large flood there will be frequently a great many fish. About forty salmon have spawned about Ripon Bridge in the course of three or four weeks. Some years we have no fish whatever higher up, owing to Linton lock, but this year we have had a great quantity, on account of the floods.

“13,643. Does Lord Bolton wish to preserve the river, if the fish had a free passage over the lock? Yes; and Mr. Scrope, who has a great deal of property on the river's side, he would be glad to preserve the fish.”

The water-power of the river Ure is very considerable, and the whole of the corn grown in the district through which the river flows, that is not sent to more distant markets, is ground by it. There are also a few woollen and flax mills on the banks of the Ure, which are well supplied with water-power. The number was considerably greater in former times, when manufactures were less

concentrated than they are at present. There is scarcely any, if any, workable coal in the district watered by the river Ure; but the greater part of it abounds in limestone, and in many valuable varieties of building stone. Throughout the whole of this district the buildings are of stone, and present a very light and cheerful appearance.

The River Nidd.—The river Nidd, the third great tributary of the Ouse and the Humber, rises on the south-east side of an amphitheatre of rocky mountains, formed by Great Whernside, 2243 feet; Little Whernside, 1984 feet; Great How, on North Moor, 1786 feet; Brownridge, 1563 feet; Lofthouse Moor, 1450 feet; Fountain Firth Moor, and High Ash Head Moor, at Ousterbank rising to the height of 1450 feet. Within this range Stone Head Pasture also is of the elevation of 2000 feet; and Rain Stang, of 1483 feet. Black Fell is the general name given to this wild and heath-covered region, in the last Ordnance Survey. The river winds through these mountains to Ramsgill and Bonthwaite, everywhere presenting the aspect of a wild mountain stream. The Nidd has more the character of a mountain river throughout the greater part of its course, than any other of the large Yorkshire rivers. It is not navigable, except for boats, in any part of its course.

After flowing almost due east for a few miles down Nidderdale, the Nidd strikes on the base of Brown Ridge and Lofthouse Moor, which turn it southward to Middlesmoor and Lofthouse, near the latter of which places it receives the waters of How Stone beck, which are nearly as abundant as its own. Between Lofthouse and Ramsgill it flows south-east through rich grazing lands, covered here and there with tumuli, and also yielding stone suited for grinding purposes, and a few thin beds of coal, on some of the highest hills.

From Ramsgill the Nidd flows by Homehouse to Gouthwaite Hall, once the residence of Eugene Aram, near which place it receives Burngill from the west. Thence it descends by Brownstay Ridge (1095 feet) the Rolling Mill, and the Flag Stone Quarries, to Pateley Bridge, the principal town in this rich mineral district. From Pateley Bridge it runs by Castlestead to Dacre Banks, near the wild and rugged scenery of Brimham rocks. Below that point it receives Darley beck; thence through a winding valley down to Hampsthwaite, and from that point to

Ripley. This whole district is full of wild rocky scenery and objects, some formed by nature, others by art in very early ages.

From Hampsthwaite the Nidd runs with a south-easterly course towards Ripley, leaving Ripley Park and Castle to the north, and receiving the stream that flows through the park. The Nidd Valley Railway winds along the north bank of the river in this part of its course, crossing it a little further south by a lofty viaduct. Nidd Hall rises on the high ground on the south side of the river. From the Nidd viaduct the river winds through very deep banks, known as Bilton Banks, down to Knaresborough, passing High Moor and the Great Camp immediately opposite to Bilton Banks; thence it flows down to Knaresborough Castle, whose outworks it washes on the western side.

The river Nidd then runs by the town of Knaresborough to St. Robert's Chapel, and on to Plumpton. There it changes its course, and with many windings flows down to Goldsborough Hall, one of the seats of the earl of Harewood, and to Ribstone Park, the residence of Joseph Dent, Esq. After receiving the Crimpe beck from the east, the Nidd flows by Washford to Cowthorpe (famous for its magnificent but now ruinous oak, said to have been the largest ever grown in England), and so on to Hunsingore.

Here the Nidd enters the new red sandstone formation, and flows with numerous windings across the great Yorkshire plain. It is crossed by the Roman road near Cattal Magna, and thence runs to Kirk Hammerton, and so on through the meadows to Nun Monkton, on the river Ouse, where it discharges its waters into that stream, immediately opposite to Beningbrough Park.

The course of the Nidd is almost directly from north-west to south-east, until it reaches Knaresborough. It then runs for some distance somewhat further southward; but on entering the new red sandstone plain, a little before it reaches Hunsingore, it takes a north-easterly course, with many graceful windings, before it joins the Ouse.

The valley of the Nidd, and the wild mountains from which that river flows, are very rich in minerals, especially in lead ore, limestone, and building stone. There is also much water power, which is chiefly used in flax spinning and corn mills, or in preparing the mineral ores of the district. There

in the valley of the Nidd or in the surrounding hills, and the stream of the river is so rapid that it has never yet been rendered available for the purposes of inland navigation.

The River Wharfe.—The river Wharfe, the fourth great tributary of the Ouse, is formed by the becks and streams that rise in Cam Fell, and other mountains which divide the rivers flowing westward into the Irish Sea, from the streams running towards the German Ocean. The highest of these mountains, Dodd Fell, rises about 2189 feet above the level of the sea. The two principal streams by which the Wharfe is formed, are the Outershaw beck and the Green Field beck. These streams both run eastward, and unite opposite High Bank, flowing through Langstrothdale, formerly an ancient chase.

From High Bank the river Wharfe descends Deepdale to Buckden, where it is joined by several other streams from Buckden-out-Moor, which is 2302 feet in height. Here the valley begins to widen, and from Buckden to Kettlewell, it is covered with rich meadows, bounded, however, on both sides by lofty ranges of hills and rocks. Starbotten is the principal village in this part of the valley.

From Kettlewell the Wharfe flows almost due south by Conistone and Netherside to Threshfield, Grassington, and Linton, a country rich in lead-mines. Thence it runs down to Barnsfield, receiving the streams of Harden Moor, the river Dibb, from the north, and those of Rilstone and Thorpe Fell (1661 feet) from the west. With many windings it reaches Appletreewick, also rich in lead-mines.

Below this point the river enters the wild and romantic scenery of Barden and Bolton Park. It flows rapidly past Barden Tower, an ancient mansion of the De Cliffords, but now belonging to the duke of Devonshire. Here it enters a wild and narrow ravine, the rocks pressing the stream on both sides, until it forces its way through a cleft only about six feet broad, cut by the water in the rocks to a great depth, known as the Strid. Through this it rushes with a roar that is heard over the neighbouring hills. This was the scene of the catastrophe of the "Boy of Egremond," and it has in modern times been the place of death of more than one unfortunate person, who has either attempted to cross the stream, or accidentally fallen into its boiling waters.

We are indebted to Dr. T. D. Whitaker's Craven, for the

following account of the early part of the course of the river Wharfe :—

“From the source of the river Wharfe down to Kettlewell, a tract of fifteen miles, the Wharfe, which is here an inconsiderable stream, flows amongst wild hills, and even here repays the skill of the angler by the finest trout. The waters rise very suddenly, and frequently overflow some of the richest meadows in Craven.

“At the northern extremity of the parish of Linton the valley of the Wharfe expands into a tract of level meadow and pasture. The strand of the river is broad and pebbly, and a tract of five miles from Linton to Kettlewell maintains a character peculiar to itself; for the tints are almost universally light green and grey; the foliage is that of the pale and elegant ash; the stream when illuminated by sunshine, an undulating line of silver; the villages stone colour, softened by distance or mellowed by time. Even the leaden coverings of their little churches harmonize with the general effect; but above all, the brown and purple fells are withdrawn, and as far as the eye can range to right or left the sloping sides of the valley are covered with a scabrous surface of limestone blanched by storms, which in a powerful sun oppresses the strongest vision by its whiteness. Immediately beyond Kilnsey a collateral valley forks off to Arncliffe, with little to distinguish it from the vale below but a long ridge of rocks, greatly inferior in height and boldness to that of Kilnsey, but more perpendicular than those of its environs.

“From Barden Tower to Bolton, a tract of three miles, the scene is unequalled in richness and beauty. On a low peninsula, formed by a curvature of the Wharfe, and at the very point where the contracted gorge of the valley begins to expand, are the ruins of the priory at Bolton. Either bank of the river, which is here bold, broad, and rapid, is hung with native oak, ash, wych-elm, birch, alder, &c., of the finest growth, showing the richness of the soil by expanding leaves of unusual size, and by that pendulous inclination of the branches which always accompanies luxuriant vegetation. To the left is the park of Bolton, ranging nearly from the river to the summit of the fell, where the blasted heads of weather-beaten oaks form no unpleasing accompaniment to the forked antlers of a herd of stags almost always seen in the horizon.

“The river Wharfe, from its varied character, successively deep and

shallow, still and rapid, is adapted to the habits of every species of the finny tribe which delights in clear and uncontaminated waters. For the Wharfe is beautifully transparent, not indeed, like the streams which feed the Cumberland lakes, perfectly colourless, but resembling brown crystal, which tinges without obscuring the objects seen through its medium.

"The Wharfe is peopled in unusual abundance by the trout, the umber, the grayling, the lamprey, dace, barbel, and chub. But smelts, which once abounded in this river, are now rarely caught; a deprivation of which the epicure, no less than the angler, has reason to complain, as no other fish, not even the trout, are comparable to them in point of flavour.

"Up the stream from Bolton Abbey, and in the deepest recesses of the valley, is the well known Strid, rendered doubly interesting by the ancient anecdote attached to it, where the whole body of water is suddenly contracted into a space of six feet, and shot with proportionate rapidity through the rocky channel. Grey, towerlike projections of rock, stained with the various hues of lichens, and hung with loose and streaming canopies of ling, start out at intervals; beyond which, the scene terminates with the shattered remains of Barden tower, shrouded in ancient wood and backed by the purple distances of the highest fells."

After issuing from the Strid the water pours with great rapidity down the valley, which however, begins to widen, although the Wharfe has all the attributes of a mountain stream, until it has passed the high grounds of Bolton Park, and reached the rich meadows of Bolton Abbey. Here it is very rapid, but passable by stepping stones in dry weather, though impassable after heavy rains.

Below Bolton Abbey the Wharfe flows past Addingham and Ilkley Moors, down to the pleasant watering place of Ilkley, the Alicana or Olicana of the Roman Itineraries. Here the valley again widens and presents a succession of well-wooded parks, standing in green meadows, and backed by lofty hills, as far as Otley. The most extensive mills in this district are those of Burley; but the general characteristics of the valley are rather those of agriculture and pasturage than manufactures. Immediately to the south of Otley is the steep height known as the Otley Chevin, which rises to a height of 925 feet, and commands magnificent views both up and down the vale, as well as of the beautiful grounds of Farnley Park immediately opposite.

At Otley the valley widens, though the hills are still lofty. Below Leathley Hall the Wharfe receives the river Washburn from the northern moors, with several smaller streams from the south. Thence it winds gracefully through Arthington Pastures and past Arthington Hall to Harewood, the noble mansion and beautiful park of the earls of Harewood. Here the valley again widens, presenting everywhere green meadows and hills gently sloping down both to the northern and southern banks of the stream. In its windings it passes Woodhall, Collingham, and the town of Wetherby, formerly a fortified passage across the Wharfe, and on the south Beilby Grange. After several bends the river reaches Thorp-arch with Boston Spa, one of the favourite watering places of Yorkshire. Below Thorp-arch it is crossed by the Yorkshire and North Midland Railway, very near the point where it was formerly passed by the Roman road, near St. Helen's Well. From this point the windings of the river are incessant, down to Tadcaster, and here are the remains of an ancient castle and a Roman road.

It was in this part of the Northern road, near the passage across the Wharfe, that the two great armies of York and Lancaster came in conflict on Towton Field, supposed to have been the most bloody and decisive battle ever fought on the soil of England. In this battle it is said that as many as 40,000 men were slain, besides a great number desperately wounded or killed after the battle. The scene of the battle was the peninsula of land, bounded on one side by the river Wharfe, and on the other by a small brook named the river Cock, which comes down by Grimstone Park from the neighbourhood of Aberford. According to the tradition of those times, the latter stream was choked with dead bodies, and for a time flowed with blood. Passing Towton Field we come to Grimstone Park, the seat of Lord Londesborough. At Bolton Percy the Wharfe receives the waters of a small stream named the Foss, from the neighbourhood of Wighill. Thence it winds across the meadows to Nun Appleton, where it joins the river Ouse.

The length of the river Wharfe is seventy-five and a half miles.

The geological formation of the country traversed by the river Wharfe is as follows:—It rises in the carboniferous rocks of the Yoredale strata, and flows over those rocks down to Barden, near Bolton Abbey. From that point the Wharfe flows over the millstone grit to beyond Harewood. A few miles below Harewood, near Wetherby, it crosses the magnesian limestone; and near Thorp-

arch it enters the new red sandstone plain, across which it flows by way of Tadcaster into the river Ouse.*

The Salmon Fishery of the River Wharfe.—The following evidence with regard to the past and present condition of the salmon fishery in this beautiful river, was given at the inquiry of 1861, by the Rev. William Henry Challoner, of Newton Kyme, on the Wharfe :—

"13,370 (Chairman). Where do you reside ? At Newton Kyme, upon the Wharfe ; I have resided there for fourteen years.

"13,371. Do you know the Wharfe well ? Yes.

"13,372. Are you an angler ? Yes, and have been almost ever since I could walk.

"13,373. Can you state the produce of the Wharfe thirty years ago ? Previously to 1807, I believe there was no impediment on the river, so that the salmon could always go up to the spawning ground ; and in those days the servants used to stipulate that they were not to have salmon above three days a week. In 1807, or within a year or two, the late Lord Egremont built a new dam at Tadcaster, of a different shape to the old weir.

"13,374. What has the produce of the river been within the last few years ? It gradually declined till about ten or twelve years ago ; we were trying to preserve the river higher up, and we made an application to the magistrates under the Act of Parliament, including the Severn and several other rivers, by which the magistrates have power to fix a close time, and we got the close time fixed from the 25th of September to the 25th of February. Then a subscription was raised to put up salmon stairs at the side of the dam, and, I conceive, since those salmon stairs have been put up a considerable increase has taken place ; but it was found necessary, in order to make the salmon stairs work properly, to place a piece of wood on the top of the dam, and the proprietors above objected to that, as it dammed up the water and prevented drainage taking place. A considerable quantity of salmon got up, and the last two or three years there has been a very material increase, certainly owing to the salmon stairs."

"13,397. Are there any deleterious matters discharged into the river Wharfe ? None.

"13,398. Are there any manufactories on it ? Nothing to injure the fish directly or indirectly : the water is pure, and I drink it very often.

"13,399. Are there no tanyards or gasworks on the Wharfe ? No, nothing to injure the water ; I never knew fish killed at any time by the water. About 1846 I was staying a mile from Thorp-arch dam ; I walked over there and stood at the dam ten minutes one day, and ten minutes the next day, and in those twenty minutes I saw 136 fish leap at Thorp-arch ; of course a good many might be the same, but they could not be the same both days : the floods had been very favourable."

The following confirmatory evidence was given by Mr. Edwin Chadwick, agent to Lord Londesborough :—

"13,464. (Chairman.) Are you agent to Lord Londesborough ? Yes.

"13,465. Do you know the river Wharfe ? Yes.

"13,466. Do you agree with Mr. Challoner's observations upon it ? Generally. This last season we started fishing at the usual time, and we caught 162 salmon ; the average weight of which was nine pounds, and the total weight, 1545 pounds—in four and a half miles of water.

"13,467. How were they caught ? With sweep nets.

"13,468. Whereabouts in that water ? There are several pools below Tadcaster dam, going towards the village of Ulleskelfe. It is our intention to do away with the hecks ;

* Ramsay's Geological Map of England and Wales.

we never catch any after the season, and we convicted a man for taking fish about a fortnight ago."

Mr. William Wright, representing the earl of Harewood, gave the following evidence:—

"13,704. (Chairman.) Do you represent Lord Harewood? Yes.

"13,705. Have you heard the evidence to-day? I have.

"13,706. Do you agree generally with what has been said with regard to the obstructions? Decidedly so. Mr. Chadwick made the remark that we caught a deal of small fish at Harewood; it is very little that we catch there at all; we have no salmon at all; we have pike fishing and fly-fishing for trout. There is a copy of the regulations, which we give to parties who have permission to fish (handing in a paper.)

"13,707. Does Lord Harewood take any interest in the river? A great interest. He wished me to come and express his concurrence with the objects of the commission, namely, the improvement of the breed of salmon; and I have no doubt that he would join with the other proprietors in any measures that might be thought desirable.

"13,708. (Mr. Rickards.) Does Lord Harewood own any lock? He owns Harewood dam; but there is no trap in it.

"13,709. Is that a great obstruction? Yes; the salmon do not get up it; but the great obstruction is at Tadcaster dam below.

"13,710. Can salmon get up Harewood dam in any state of the water? They can in very high water, but there are scarcely any to get up, because they are detained at Tadcaster.

"13,711. Do you think that if facilities were given for salmon to get over Tadcaster dam, Lord Harewood would give facilities for their getting over Harewood dam? I have no doubt he would, and co-operate with the proprietors in promoting the breed of salmon in the river."

State of the Salmon Fishing of the Wharfe and Derwent Districts in the year 1870.—Since the evidence given above was taken, in the year 1861, considerable efforts have been made to preserve the salmon of these two rivers, and those adjoining to them. The following report has just been made to the inspectors of the salmon fisheries of England and Wales, in reply to inquiries forwarded by them to the local commissioners:—

“THE WHARFE AND DERWENT DISTRICTS.

"1. They (the salmon), of these rivers, have increased in numbers; whilst the average weight per fish is from three to four lbs. less. The Board are unable to account for this diminution.

"2. In the Wharfe district (there were taken last year), with draft net, 1017; in the Derwent district, with do., 759 salmon.

"3. All the licensed fishermen ask for an extension of the open season until the 15th September, for which they would readily give up a month at the commencement, so as to make the open season commence on the 1st March, instead of the 1st February. The Board, however, would much prefer the present open and close seasons remaining as they are until the rivers are better stocked, and the upper parts made more accessible for spawning fish, when perhaps the Board will be in a better position to judge whether a change is desirable or not.

"4. In reply to the question, Is the legal mesh suitable for your district? 'Yes.'

"5. In answer to the question, Were any new mines or factories using deleterious substances open in the Wharfe in 1869? 'None.'

"6. The Board, in the month of May last, addressed a letter to the Otley Board of Health remonstrating against the sewage of that town being discharged into the river Wharfe; but

notwithstanding, the Board have been informed that contracts have been entered into for throwing the whole of it into the river. Putting aside the importance of the fisheries, and of the value of fertilizing substances that will be wasted and thrown away, the Board are of opinion that it is essentially necessary that government should interfere to put a stop to such abuses, which are not only contaminating all our pure rivers, poisoning fish, &c., but positively jeopardizing the public health.

"7. In answer to the question, What instruments for the capture of salmon were licensed in 1869, the following list is given :—

IN THE WHARFE DISTRICT.			
Name of Instrument.	Number.	Rate at which licensed.	Number of men required to work them.
Draught nets,	22	£5	2
Rods,	7	1	—

IN THE DERWENT DISTRICT.			
Draught nets,	10	£5	2
Bow nets,	4	1	1
Offences Charged.	No. of each Offence.	Convicted or Acquitted.	Penalty if Convicted.
"8. Using a net to catch salmon during weekly close seasons, }	2	Convicted,	£2 each and costs.
Using a net or illegal mesh, }	1	"	5s. and costs.
Killing salmon not having a license, .	1	"	£10 and costs.
Having in possession unseasonable salmon, }	1	"	£12 10s. and costs.

"The board made the following general recommendation :—

"9. There seems to be little or no necessity for by-laws in these districts, until there is some expansion of the power to deal with the passage of fish over all rivers. When that is accomplished, and the rivers become stocked with fish, it will then be desirable for boards of conservators to frame a code of by-laws for the regulation of the fisheries, which the Board are of opinion should include the control and management of all salmon-fishing boats, and determine the description, size, and length of nets to be used in fishing, and the registering or labelling of the same ; to regulate the upper and lower fisheries, so as to prevent either interest predominating ; to direct the placing of grating in mill races ; to prevent the infringement of the laws affecting mill dams, fish passes, sluices, mill races, &c., and to regulate the duties of water bailiffs.

"10. The Board reiterate their wishes expressed in last year's report, viz., the merging of the Wharfe and Derwent districts, so as to form one board for the salmon rivers of this county. They also urge upon Government and Parliament the necessity for continuing the invaluable services of the special commissioners, and to enlarge and extend their powers. The Board also express a hope that the select committee will be appointed in the next session of Parliament, and that a bill founded upon the evidence will be introduced into the house, for an amendment of the fishery laws.

"11. The existing fishery acts require considerable amendments, for the reasons mentioned on this head in last year's report ; to which should be added, that the weekly close season should commence at six o'clock on Friday evening, and end at six o'clock on Monday evening." They add—

"Stringent measures should be taken to prevent the pollution of rivers, and severe penalties should be fixed for throwing cinder-slip and other refuse into the rivers, and for throwing in any deleterious matter whatsoever. Extensive power should be con-

ferred upon conservators and bailiffs to enter land in the discharge of their duties, and to search persons on reasonable grounds of suspicion; and lastly, every year the Board become more and more impressed with the necessity of securing by some legislative process a free passage for the fish to and from their spawning grounds, without which the rivers of this county can never be developed to the extent they are capable of."

The River Aire.—The rivers Aire and Calder are the two great industrial and navigable rivers of the West Riding, the seats of the woollen and the worsted manufactures, which in early times owed their existence and prosperity chiefly to the motive power supplied by these powerful streams, and their numerous auxiliaries. The waters of these two rivers, and of their tributary streams, either flowing in their natural channels, or collected in navigable canals fed from the same sources, also supplied the means by which the first lines of inland navigation were opened across England, from the German Ocean to the Irish Sea; thus affording to the districts traversed by them, the power of communicating, both with all places on their own banks, and with the two great ports of the North of England, Liverpool and Hull. In addition to these supplies of water-power, and means of internal and external communication, both the Aire and the Calder possess the great advantage of flowing over the rich coal-fields and iron beds of the West Riding, which they have most powerfully assisted to open out and develop, for all the purposes of modern industry.

The river Aire, the fifth great tributary of the river Ouse, possesses much less the character of a mountain stream, even in the early part of its course, than any of the rivers above named; viz., the Swale, the Ure, the Nidd, and the Wharfe. It does not rise in the rugged and barren moors of the millstone grit, but in the softer hills of the mountain limestone. Its springs are at an elevation of about 1200 feet above the level of the sea, in the grassy hills of Craven; and in the greater part of its course it flows through a gradually sloping valley, with a steady but not tumultuous course. It is much less rapid than the river Wharfe, but considerably deeper, and, therefore, more applicable to the purposes of industry.

Malham Tarn, a pretty little lake in the hills, which is itself the receptacle of several small streams, may be regarded as the source of the river Aire, although that name is not given to any of the

streams that flow into the tarn. It first receives the name of the river Aire as it issues, with a large volume of water, from the base of Malham Cove—a lofty limestone rock more than 280 feet high, situate between Malham Tarn and the course which the river Aire follows, after issuing from the foot of the rock. In this, and in all other mountain-limestone districts, the phenomenon of streams flowing with an underground course, and even falling as subterranean waterfalls, is of frequent occurrence, and there is no doubt that the streams which flow into Malham Tarn ultimately discharge their waters down the bed of the river Aire.

The scenery, in the midst of which the Aire rises, is alike distinguished for its beauty, its richness, and its wild magnificence. The following is Dr. Whitaker's account of this charming spot. Speaking of Malham Tarn and the sources of the river Aire, he observes:—"Here nature seems to have wantoned with unusual luxuriance; the great elevation of the fells above, which condense a vast quantity of vapours, together with the nature of the rocks beneath, full of secret fissures, contributes at once to produce the most copious springs, and alternately to exhibit and conceal them in the most fantastic manner. It is not the least curious circumstance about this place, that, on a bottom so cleft and shattered, a basin should have been left capable of retaining a sheet of water not less than a mile in diameter, for such is Malham Tarn. This pool—inestimable for its fishery of trout and perch, which grow to an unusual size, and have the finest flavour—by a rampart of a few feet at the outlet, might be made to cover the deformity of a wide peat moss, and form a beautiful and winding way in the bosom of the mountains. Yet, after all the improvement of which it is capable, Malham Tarn is in too high and bleak a situation to become very interesting as an object. Had it washed the feet of the rocks beneath, and wound along the narrow valleys to which they form so majestic a termination, nothing would have been wanting but a proper fringing of wood to complete one of the noblest scenes in the island.

"Speaking in general terms, this lake may fairly be considered as the source of the Aire; but as its outlet quickly sinks into the ground and is lost, and as several streams which appear below contend for the honour of the connection, it still remains a matter of some uncertainty to which of them the preference is to be given. The inhabitants of Malham plead, that the waters of the tarn

actually appear again in two most abundant and beautiful springs, about a quarter of a mile below the village, and nearly three miles from the place of immersion. This opinion seems most probable. But from the foot of the cove, and almost a mile nearer to the tarn, a copious stream breaks out, which has undoubtedly the second claim; yet it is well known that a collection of springs rise in the Black Hill, the Hensetts, and Wythes, and are swallowed up in a field called the Street; and from the turbid quality of the water, very unlike that of the tarn, there is little doubt that, after a subterraneous course of more than two miles, this is the stream which here emerges again. In rainy seasons, however, the overflowings of the lake spread themselves over the shelving surface of the rocks below, and precipitating from the centre of the cove, form a tremendous cataract of nearly 300 feet. Thirdly, the Airtion Water, from which the village derives its name, seems precluded by its distance from any reasonable pretensions. Fourthly, Gordale Water, which springs in the Great Close, and of which the whole course may be traced, can have no other claim than that of a collateral feeder.

"The village of Malham is situated in a deep and verdant bottom, defective only in wood, at the union of two narrow valleys, respectively terminated at the distance of a mile by the Cove and Gordale, which have been mentioned above. The first of these is an immense crag of limestone, 285 feet high, stretched in the shape of the segment of a large circle across the whole valley, and forming a termination at once so august and tremendous that the imagination can scarcely figure any form or scale of rock, within the bounds of probability, that shall go beyond it.

"The approach to Gordale on the east side of the village happily remains what nature left it, a stony and desolate valley, without a single object to divert the eye from the scene before it. This is a solid mass of limestone colour, of perhaps equal height with the Cove, cleft asunder by some great convulsion of nature, and opening 'its ponderous and marble jaws' on the right and left. The sensation of horror on approaching it is increased by the projection of either side from its base, so that the rocks, though considerably distant at the bottom, admit only a narrow line of daylight from above. At the very entrance you turn a little to the right, and are struck by a yawning mouth in the face of the opposite crag, whence the torrent pent up beyond suddenly forced a passage within the memory of men, which at every swell continues to spout out one of the boldest

and most beautiful cataracts that can be conceived. Wherever a cleft in the rock or a lodgment of earth appears, the yew tree, indigenous in such situations, contrasts its deep and glossy green with the pale grey of the limestones; but the goat, the old adventurous inhabitant of situations inaccessible to every other quadruped, has been lately banished from the sides of Gordale.”*

The river Aire, after receiving the streams which issue from Gordale on the left, and Kirkby Malhamdale on the right, flows down to Airton, pleasantly situated in a grassy valley, and known as the birthplace of General Lambert, one of the Yorkshire heroes in the great civil war. The stream of the river Aire is so abundant that it turns the machinery of Scalegill mill, before it reaches Airton, and works another mill at that place.

From Airton the river runs nearly due south, passing Calton and Calton Hall on the left, and Otterburn Hall on the right. After passing under New Field Bridge, at which point the stream is about 500 feet above the level of the sea, it receives the waters of Eshton Tarn. Numerous quarries have been formed in the limestone rocks of this district, which serve to supply the demand for that valuable mineral on both sides of the hills. A little lower down, the Aire receives Otterburn beck from the right, and almost immediately after, supplies water-power for Bell Busk mill, and passes under the (little) North-western Railway, from Leeds to Lancaster, which crosses the river by the Bell Busk viaduct. Below this point the river Aire winds most gracefully between the heights of Ellenber and Coniston Cold, and then runs by the Ingber plantations down to Priest Home Bridge, where there is an aqueduct of the Leeds and Liverpool Canal.

At Gargrave the river Aire first comes into close connection with the Leeds and Liverpool Canal, which draws the greater part of its supplies of water from the hills on the banks of the Aire, and follows the windings of that stream to the neighbourhood of Bradford and to Leeds. This canal has now been in existence for more than a hundred years, and has been the principal means of developing the industry of this portion of Yorkshire. The original plans were formed by the great Brindley, at the time when he was engaged in constructing the Bridgewater Canal, and the whole work bears the stamp of his bold and original genius. Unlike the Bridgewater Canal, which was only thirty miles in length, and

* Whitaker's History of Craven, pp. 206, 207: 1812.

was carried through a perfectly level country, the Leeds and Liverpool Canal is 130 miles in length, and was carried across the mountain chain forming the Backbone of England. The plan of following the course of the river Aire, which ultimately flows into the German Ocean, to the point where it approaches nearest to the watershed of the Ribble, and of other streams that flow into the Irish Sea, was one of the chief means of securing success to this great undertaking. This is the only point, in a mountain range of more than 200 miles in length, at which it was possible for the engineering skill of those days, to have formed a navigable canal from the manufacturing districts of Yorkshire to the Irish Sea; though forty years later the same chain of hills was pierced at two different and much higher points, for the purpose of constructing navigable canals.

The river Aire runs from north to south, from its source in Malham Tarn to Gargrave, following a course which is nearly parallel to that of the river Ribble. At this point the two streams are within a few miles of each other; but here it is that they both change their courses, the Ribble flowing westward to the Irish Sea, and the Aire running eastward to the German Ocean. After passing Gargrave the river Aire receives a stream of water nearly as large as itself, down Eshton beck, which brings with it the waters of Mill beck from Rilstone, and those of the Waterburn from the higher ridges of Malham Moor. In its course down to Skipton, it leaves the crags of Flasby Fell, covered with ancient barrows (probably belonging to the British period), on the left, and the remains of a Roman villa, on the right. Then, passing on by Thorlby, it runs down to the neighbourhood of Skipton.

Skipton-in-Craven, the capital of the district, stands on a branch of the river Aire. The castle of Skipton, originally a place of great strength, and which is still a noble building, was erected by the ancient and famous family of the De Cliffords, earls of Cumberland, and belonged in modern times to the earls of Thanet.

Skipton stands on the mountain limestone; but to the east of that town, high and wild moors of the millstone-grit formation, known as Skipton Moor and Rumbles Moor, fill up nearly the whole of the country between the valley of the Aire and the valley of the Wharfe, rising at the White Stones to the height of 1112, and on the highest point of Ilkley Moor to 1323 feet. To the south of the Aire valley the hills rise to an almost equal

height, on the moors behind Keighley. Near the junction of the mountain limestone with the millstone grit are the lead mines of Cononley. On the opposite side of the valley is Kildwick, at the foot of lofty moors covered with barrows and other remains of antiquity. A little further south the river Aire receives the waters of the Silsden valley from the north, and, winding round Steeton Moor and Hawkeliffe, flows on to the neighbourhood of Keighley, where it receives the waters of the river Worth from that populous valley.

Keighley is the first manufacturing town situated on the course of the Aire, and is the commencement of a great scene of manufacturing industry, extending over the whole breadth of the Yorkshire coal-field.

At Bingley, which stands four miles lower down the river and has the advantage of the Leeds and Liverpool Canal, the Yorkshire coal-field commences; the river Aire flowing over it during the whole of its course, down to the neighbourhood of Normanton. From Bingley the Aire flows to the neighbourhood of the great and populous town of Bradford, and receives the waters of Bradford beck. From this point a canal was carried in early times to the town of Bradford, which placed it in connection with the great line of inland navigation, supplied by the Leeds and Liverpool Canal and the Aire and Calder Navigation; and gave a fresh impulse to its progress as a manufacturing town.

Leaving Bradford to the south, the river Aire runs at the base of the hills on which Baildon stands, between the Aire and the Wharfe. The highest point of the hills at Baildon is 927 feet above the sea, and is crowned with an ancient British cairn. On the south side of the river, the hills on which Idle is built project into the valley of the Aire, and round them the stream winds, by Esholt Hall, before it reaches the pleasant scenery of Apperley Bridge. From this point the river runs round the base of the hills on which Calverley and Farsley are built, on one side of the valley, and those on which Guiseley and Yeadon stand on the other. All these villages and towns are rich with manufactures, many of the largest woollen and worsted mills being in this district. Here the whole country abounds in coal and water-power.

Passing New Laiths, the river flows down to Kirkstall Abbey, a scene of great natural beauty, but now crowded with extensive manufactories.

The Aire flows through the large manufacturing town of Leeds, and may be regarded as the first cause of its industrial greatness. The fall of the water in its windings within the town, is sufficient to give impulse to several manufactories, and to furnish water-power at every season of the year. This is not the case in the shallower rivers of Yorkshire, which, though abounding in water-power in the winter months, are nearly dry even in ordinary summers. In addition to the river Aire itself, the water-power of Leeds is increased by the stream that enters it on the south from Holbeck, and gives name to the populous district through which it flows; and also by several streams, which unite in one at the northern limits of the town, and enter the river at the old church through Sheepscar beck. It was this abundance of water and water-power that maintained the manufactures of Leeds for many ages, before the discovery of the steam-engine supplied a new power, and gave a new form to the industry of the town.

The river Aire was made navigable from Leeds to the Ouse and the Humber more than 150 years ago; and since the middle of the last century Leeds has been the centre of a system of inland navigation, nearly the whole of which is derived, in one form or another, from the waters of the Aire and Calder. Below the town of Leeds the course of the Aire is to the south-east; and after flowing over the coal-field for a few miles, it comes out on the magnesian limestone plain. Two or three miles below Leeds the Aire passes Temple Newsam, which stands on a fine well-wooded elevation on the north-eastern side of the river. A little lower it passes Swillington Hall, and near the park and grounds of Kippax. Thence it flows through a fertile plain to Methley, and afterwards winds with many bends by way of Allerton Bywater, to Castleford, where it receives the waters of the Calder, the second great manufacturing river of Yorkshire.

Below Castleford the united stream, which still bears the name of the Aire, flows with many windings to Fairburn, Fryston Hall, and to Ferrybridge, formerly the great passage of this stream, though now superseded by the lines of railway from London to the north. From Ferrybridge the river flows through Brotherton, and through a low but fertile country down to Snaith, past Byram Park on the north, and the great magnesian limestone quarries on the south. From Knottingley a deep and wide navigable canal cuts off the numerous windings of the river Aire through

the new red sandstone plain, and furnishes a commodious line of inland navigation to the south of the town of Snaith, from which point the Knottingley and Goole Canal extends to the river Ouse at Goole, whence there is a wide and open course into the Humber. The river Aire, in its course from the neighbourhood of Knottingley, passes Berkin on the north, Kellington on the south, and Chapel Haddersley in the neighbourhood of Snaith, flowing between Carlton Park on the north, and Cowick Park on the south.

Below Snaith the river Aire winds through extensive meadows to Rawcliffe, and enters the river Ouse near Goole.

The River Calder.—The river Calder is the second great manufacturing river of Yorkshire, and the sixth chief tributary of the Ouse. The Calder was rendered navigable in the early part of the last century from the point where it falls into the river Aire at Castleford up to Wakefield; and some years later, the forming of the Calder and Hebble Navigation extended that cheap mode of communication to Huddersfield and Halifax, connecting all the three towns with the Humber, the port of Hull, and the German Ocean. Within the last hundred years navigable canals have also been constructed in connection with the navigation of the Calder, which cross the great chain of hills dividing Lancashire from Yorkshire, at two different points, and form connections with the rivers and canals of Lancashire, and through them with the Irish Sea and the Atlantic Ocean. The rivers Aire and Calder are the only two rivers in the north of England which have been used for the purpose of forming direct communications by water from the German Ocean to the Irish Sea and the Atlantic; and though the modern improvement of railways has caused the benefits conferred by navigable canals to be in a great measure forgotten, there can be no doubt that they were, for at least one hundred years, amongst the principal means of developing the industry of the districts in which they were formed.

The river Calder rises in the western hills, beyond the borders of Yorkshire, at the foot of Boulsworth Hill, which divides some of the waters flowing into the Irish Sea from those which flow eastward into the German Ocean. The course of the Calder, until it enters Yorkshire, is south-easterly, flowing over wild moors to the head of the valley leading down to Todmorden. At Todmorden it enters Yorkshire, and for some distance bends

its course slightly to the north-east. The Calder everywhere supplies great abundance of water-power, and works a succession of manufactories from the point where it enters Yorkshire down to Wakefield. Its tributary streams are extremely numerous, and the valleys through which they flow are full of busy inhabitants, and are the seats of never-ceasing industry. At Todmorden, the point at which the river Calder enters Yorkshire, it strikes upon the eastern edge of the Lancashire coal-field, and thence flows over the millstone grit nearly to Elland, a few miles south of Halifax and north of Huddersfield, both of which stand on the western edge of the Yorkshire coal-field. From Elland it flows over the coal-field through Dewsbury and Wakefield to the neighbourhood of Castleford, where it falls into the river Aire. Below that point the united waters of the Aire and Calder pass over the magnesian limestone, the new red sandstone, and deep beds of alluvium, to the river Ouse. In crossing the Yorkshire coal-field the Calder receives the river Colne from the neighbourhood of Huddersfield, as well as numerous brooks both from the north and the south.

The river Calder, after leaving Todmorden, runs through a beautiful green valley, inclosed by lofty hills. Down this valley the river, railway, and canal run either side by side, or crossing each other by numerous bridges and viaducts, to Hebden Bridge, where the river receives the waters of the Hebden, and the streams from Widdop, Heptonstall, and Wadsworth Moors, on the north; and, a little lower, to Mytholmroyd, where it receives the waters from the Soyland Moors on the south. Water-power is very abundant in all these valleys. From Mytholmroyd the Calder winds down to Luddenden-foot, receiving streams from Warley and Saltonstall Moors, crowned with the rock known as the Rocking Stone.* Below this point the Calder flows with a south-eastern course to Sowerby Bridge, near which place it receives from the south the waters of the Ribourne, from Ripponden. In the last Ordnance Survey of the wild and lofty moors from which these tributaries of the Calder descend, numerous remains were found of British antiquity in the form of beacons, rings of stones, rocking stones, and other objects connected with the wars and the superstitions of ancient times. Many of these are now nearly obliterated by the hand of time, but some still bear undoubted traces of the early inhabitants of this part of Britain.

* Ordnance Survey Map, 88.

From Sowerby Bridge the river Calder bends to the south, being turned from its previous course by the steep hills on which the town of Halifax stands. Halifax, like Huddersfield and Bradford, is not built on the main stream flowing through the district, but on one of its numerous tributaries, on which the water-power, though less abundant, was more manageable in former times, and whence also access to the coal-field of the district was somewhat easier. Near Elland is Fixby Hall, for many ages the seat of the distinguished family of the Saviles, marquises of Halifax, who bore the title of Lord Elland, as their second dignity.

Elland and Brighouse were the two principal passages and bridges across this part of the river Calder. Between and below them the valley widens, though it is still bounded by lofty hills, extending to Rastrick on the south, and South Oworm and Lightcliffe on the north. From Lightcliffe a considerable stream runs down to the Calder at Brighouse, through an exceedingly pretty, well-wooded country, in which the bright green of the valleys seems to be even brighter amongst the dark hills, the sides of which are planted with extensive woods. These become thicker and more extensive in approaching Kirkstall Hall, the seat of Sir George Armitage, baronet, whose family have held this estate from the reign of Queen Elizabeth. In this beautiful part of the valley of the Calder there was formerly a priory of nuns, and some remains of the priory still exist. The neighbourhood is also famous in tradition as the scene of the exploits, and of the death, of Robin Hood. In ancient times the great forest of Sherwood, which was, no doubt, the scene of many an outlaw's exploits, extended northward over the strong land of what is now known as the great coal-field of Yorkshire and Nottinghamshire from the banks of the Aire and the Calder, to the southern bend of the river Trent, at Nottingham. Great part of this district was covered with thickets, woods, parks, and wastes until comparatively modern times; and beyond the woody districts, heath-covered hills and mountains extended into Lancashire and Derbyshire.

The river Calder receives, near Cooper Bridge, the river Colne, coming down from the busy manufacturing town of Huddersfield, and bringing with it the waters of many small streams, almost from the borders of Lancashire. The Colne rises in the highest part of the rocky heights which separate Yorkshire from Lancashire. Amongst these points are Dean Head Moss, 1661 feet;

Holme Moss, which is 1909 feet high at the point where the waters that flow to the north separate from those that flow to the south; West Nab, 1641 feet; and Birk Moss, almost equally high. From these hills numerous small streams flow down the different cloughs or ravines, uniting in the Wessenden reservoir, whence the river Colne runs northward to Marsden, turning several mills in its course. Near Marsden the course of the Colne turns eastward towards Slaithwaite, then flows down the valley with a north-eastern course, passing between Golcar and Longwood on the north, and Linthwaite on the south. In its course eastward the stream receives several brooks from Crossland Moor on the south, and Holestone Moor on the north, near which, at Slack, are the remains of a Roman camp and permanent station. These hills are covered with ancient British remains, and were formerly traversed by one, if not two, of the military roads of the Romans. Leaving Lockwood to the south, the river Colne runs at the base of the hills on which the town of Huddersfield stands. Thence it flows, in a northerly direction, to its junction with the Calder, receiving a considerable stream from the Holmfirth valley, which is the seat of a great and flourishing industry.

The river Calder, after receiving the waters of the Colne near Cooper Bridge, passes through the pleasant district of Mirfield, to the large manufacturing town of Dewsbury, where it receives from the north the streams that water the populous valley in which Cleckheaton, Liversedge, and Heckmondwike stand. The Calder and Hebble Navigation runs along the side of the river Calder, connecting the towns in the upper part of the valley with Wakefield, and the Aire and Calder Navigation.

Near Dewsbury the Calder receives other streams from the neighbourhood of Birstal and Batley on the north, and, below Dewsbury, flows with many graceful windings through a broad and fertile valley, to the neighbourhood of Horbury. To this point the high grounds on the north bank of the river cause its course to bend somewhat to the south-east; but near Horbury the hills recede on the north, and the river Calder turns to the north-east, to the foot of the hills on which Wakefield stands. The ruins of Sandal Castle lie a little to the south of Wakefield; and it was in the meadows between Sandal Castle and Wakefield Bridge, that the great battle was fought, in which Richard Plantagenet, duke of York, the father of King Edward IV. and Richard III., was defeated

and killed, by the armies of the house of Lancaster, commanded by Queen Margaret of Anjou and Lord de Clifford.

Below Wakefield the country becomes more level, and the valley much wider, with numerous fine parks and handsome mansions on both sides of the river. Here the windings of the stream are incessant, and in several cases take it for a while far back from its prevailing course, which is to the north-east. This course the Calder follows to the neighbourhood of Methley, where it enters the plain through which the river Aire flows, joining that stream at Castleford, supposed to be the *Lagecium* of the Romans, situated in one of the most fertile districts of the West Riding, within a short distance of the fine parks of Methley, Kippax, Ledsham, and Fryston, and a few miles north of the ancient and pleasant town of Pontefract.

The River Don.—The Don, the seventh great tributary of the Ouse, rises from a number of springs, one of which is known as the Dun well, near the point at which the Manchester and Sheffield Railway passes through the Woodhead tunnel. The highest points of the neighbouring hills are Black Hill, Holme Moss, 1909, Ramsden Edge, Pike End, Snailsden, 1565, Dead Edge, 1479, and Holme Cliffe, 1635. From these hills the streams flow some of them north through the Holmfirth valley, and others westward into Lancashire; but the greatest flow of water in one stream is that to the east, down the river Don, which supplies the Dunford Bridge reservoir, and then runs on by Dunford Bridge eastward towards Penistone and Sheffield. An auxiliary stream, known as the Little Don river, rises in the same hills, near an ancient circular earthwork named "the Camp," and flows nearly parallel to the main stream of the Don until it joins it. A third stream, known as the Ewden river (which is said to be a corruption of the Anglian god, Woden), rises at the foot of Ewden or Woden heights (1220 feet), and also flows parallel to the Don, which it ultimately joins. From the north another large stream, known as the Scout Dyke, comes down from Upper Cumberworth by the British fortifications of Castle Hill, and joins the Don at Penistone. Both the words Cumberworth and Penistone are of British origin, though with English terminations, and date from the time when the Cymry or Cumbers, whose name is also found in Cumberland, took refuge in these hills from the invading Angles.*

Below Penistone the valley of the Don begins to widen slightly,

* See Ordnance Survey of Yorkshire.

though closed in at different points by the lofty heights of Copstar and Thurgoland. Descending the valley, the range of the Wharnccliffe rocks and the woods of Wortley Park rise above the green valley through which the river flows. The greater part of this country is richly wooded, chiefly with oak timber, and is justly regarded as one of the most beautiful districts in the north of England. Opposite to the Wharnccliffe the river Ewden or Woden, with other streams, flows into the river Don.

After passing Wharnccliffe, the Don flows by Oughtibridge, and through a country rich in coal and manufactures to Sheffield, passing through this great seat of industry at the most southern part of its course. At Sheffield the Don receives the river Sheaf and numerous streams flowing from the hills, which are amongst the principal support of the industry of that district, turning innumerable mills employed in the production of cutlery and machinery. The river Sheaf comes down from the south-west, from the neighbourhood of Dore. The smaller streams of this district are almost innumerable, and it is chiefly owing to the abundant supply of water-power over the whole district of Hallamshire, the great supplies of charcoal which existed in former times, and the abundance of coal found at present, that the cutlery trade of Sheffield has grown to an extent that has never been equalled in any other part of England. During the last few years, also, all branches of the steel and the iron trades have increased rapidly in Sheffield and the neighbourhood, including the manufacture of those immense iron plates with which the iron-clad ships of the British navy are now covered. We shall trace the history of Sheffield and Hallamshire, and of their trade, in a subsequent chapter of this work.

From Sheffield to Rotherham the river Don flows through a fertile valley, with hills rising very steeply on both sides. Just before reaching Rotherham the Don is joined by the river Rother, running from the south, out of Derbyshire. Rotherham is a rapidly increasing manufacturing town, situated upon the great coal-field of Yorkshire, near the point at which it joins the Permian formation. The red sandstone of Rotherham belongs to the latter; but the prevalent formation is still the coal, and much iron of very superior quality is found in this district.

From Rotherham the river Don flows across the coal-field to Conisbrough, famed for its ancient castle, which we shall describe

elsewhere. Here it cuts its passage through the cliffs of the magnesian limestone. But before reaching Conisbrough the Don receives the river Dearne, a very considerable stream flowing from the north, and passing through a country abounding in coal, iron, and other minerals. The river Dearne rises between Wakefield and Barnsley, and is the natural outlet for the south Yorkshire coal-field. After flowing some distance to the south-east of Barnsley, the Dearne is joined by the river Dove, which also runs over a very rich part of the Yorkshire coal-field. Many years ago these districts were opened out to trade, by the forming of Dearne and Dove navigation and canal, which connects them with the manufacturing districts of Yorkshire. In its course down to that river the Dearne flows through a moist valley, by way of Wombwell and Bolton-upon-Dearne, entering the Don opposite to Conisbrough, near the junction of the coal and Permian formations.

The river Went, a smaller stream, rises in the neighbourhood of Wentworth, and flows with a south-east course into the river Don, but at a much lower part of its course, near the commencement of what is called the Dutch river. From Conisbrough the Don flows through a hilly, rocky, but well wooded country, by Sprotborough, over the magnesian limestone formation, to the neighbourhood of Doncaster. At that point the river enters the new red sandstone plain, which, however, is very thickly covered with alluvial deposits. Doncaster stands on or near to the site of the Roman town of Danum, and, besides being one of the most pleasantly situated towns in the north of England, it was in early times of great importance, in connecting the trade of the eastern part of the north of England with the west. In modern times the river Don has been made navigable above Doncaster; but it has always been navigable as far as that town, and in former times, that was the point at which goods brought by land carriage out of Lancashire were put on board lighters to be transported to the port of Hull. At the beginning of the eighteenth century goods were carried on the backs of horses from Doncaster to the river Mersey at Stockport, where they were embarked and sent down the Mersey to Liverpool.

Below Doncaster the river Don pursues a very winding course, passing by Whateley, Long Sandall, Barnby-on-Don, Stainforth, and Thorne. From Thorne it flows through the artificial course of the Dutch river, south of Snaith and Rawcliffe, into the rivers Ouse

and Humber, the former of which it joins near to the port of Goole. The large portion of the trade of Southern Yorkshire still passes along this course.

In addition to the rivers above described, all of which flow from the western hills or the Penine chain, and ultimately discharge their waters through the Ouse and the Humber into the German Ocean, there is one considerable river, namely, the Ribble, and several smaller streams, which also rise in the western hills of Yorkshire, but discharge their waters westwardly either into the Irish sea, or into some of the rivers that flow into it. We shall briefly describe the course of these streams, before speaking of the rivers which flow into the Ouse and the Humber from the east, or of those that discharge their waters directly into the German Ocean.

The River Ribble.—The river Ribble rises at Ribble Head, above Settle, in Ingleton Fells, at a height of 929 feet above the sea, in the chain or group of hills from which the springs of the rivers Wharfe and Aire draw their first supplies. Whernside with its tarns rises to the west, Blea Moor to the north, and Cam Fells to the east. The river Ribble flows almost due south during the first part of its course, leaving it doubtful for some time whether it will ultimately turn to the east or to the west, passing by Dear Bank and the steep rocks of Horton Moor, on the left, and Ingleborough, rising to the height of 2372 feet, on the right. In flowing down Ribblesdale the river runs by Selside and an ancient tumulus near Low Moor, and flows down to Horton in Ribblesdale, where it is still 760 feet above the level of the sea. Running southward by Crag Hill, the Ribble receives numerous streams from Ingleborough, on the one side, and Penneghent, on the other. In these cool pure waters the salmon, for which the Ribble is so much celebrated, are bred. From Great Stainford the river flows over moors covered with ancient barrows, to Langcliffe Hall, and near to Giggleswick, where a steep line of limestone scars stretches, like a gigantic wall, across the moors, running many miles from west to east. Thence the Ribble flows down rapidly to Settle.

Below Settle the valley of the Ribble widens, and the river becomes more abundant, being fed by numerous streams descending from the range of scars above named. Among the most considerable of these are the Scale Bar beck, which flows down from the Roman camp near Settle, and enters the Ribble across Long Preston Ings, and on the opposite side Rathmell beck, and the stream that descends from the base of Whelpstone Crag. A little lower the

Ribble flows between the grounds of Hellfield Peel and Halton Place, to Paythorne and Castle Haugh, near which are numerous barrows and other remains of antiquity. Thence it passes by Gisburn into Lancashire, receiving the river Hodder from the north, and ultimately reaching the Irish Sea at Preston.

Salmon Fisheries of the River Ribble.—The river Ribble, rising in the highest hills of Yorkshire, and receiving numerous beautiful mountain streams, is one of the finest and most productive salmon rivers in England. In the year 1869 it produced 6852 salmon, although the season was not favourable.* In the inquiry before the commissioners on the fisheries of England and Wales, made in the year 1861, much evidence was given by various witnesses as to the salmon fisheries of the Ribble.

Captain E. Sheppard gave the following evidence as to the natural capabilities of the river, in reply to the questions of the chairman of the Commission:—

“Is the Ribble a good spawning river? I should consider it impossible to have a better; the Hodder, and what we call the Little Ribble, which are tributaries to it, contain fine gravelly beds all the way up for miles and miles.

“Are there any obstructions upon the Ribble or Hodder, either natural or artificial? On the Hodder there is only one obstruction, but on the Ribble there is a natural rock called the Cow’s Tail, at Slideburn, which prevents the salmon getting up; the morts and sprods can get up; there are beautiful spawning-grounds above, and a slight expense will alter it; we have the permission of the owner to make that alteration.

“How does it happen that the morts and sprods get up, and not the salmon? A little stream comes over the top of the weir, which is large enough for the small fish, but not for the salmon. The weir is partly natural, and partly artificial; there is just a balk put across the top of the rock, to turn off the water to the corn-mill.

“What other obstructions are there? Some little distance above Settle there is a natural fall, over which fish cannot pass, even if they could get to it; but there is a mill weir at Settle which effectually prevents the fish getting there: that is at Giggleswick—the Wigg corn-mill.

“Is the weir perpendicular? Yes.

“Do you know the height of it? No, I do not; but it is a decided obstruction, and no fish get beyond it—either sprods, or morts, or salmon—even in high floods.

“(Mr. Ffennell). How were the fisheries the year before last? The year before, they very greatly increased; ten years previous to that was a wet season, and the lessee of the fishery seven miles above Clitheroe weir, which fish cannot get up, according to Mr. Whalley’s account, found sixty pairs of spawning fish, sufficient to enlist his co-operation in the improvement of the fisheries.

“Is there good spawning ground on the Ribble? I do not think any river in the kingdom is more advantageously placed, or where there are so many spawning grounds, or so good. I think, unless you can insure a supply of good fish to the upper proprietors, so as to give them some inducement to preserve the fish, and take care of them when they are spawning, nothing you can do will avail to increase the supply of fish. It is not very likely that the upper proprietors will protect the fish when spawning, to be merely brood hens for the people below.”

* Ninth Annual Report of the Inspectors of Salmon Fisheries (England and Wales), 1870, p. 69.

Since the inquiry of 1861 great alterations have been made in the river Ribble, with a view to improving it as a salmon river. The Ribble is at present the third most productive salmon river of England, yielding from 6000 to 7000 salmon yearly, whilst the Tees has in some years yielded as many as 10,000 salmon, and the Tyne still more. All the other Yorkshire rivers together, with the exception of the Tees, only yield about 3000 salmon yearly, on the average of the last three years.* The Report on the Ribble Salmon Fisheries, published in 1870, is not quite so favourable as those of three preceding years, owing to the excessive dryness of the season. We give it, however, as showing what are the improvements which have been made, and what are still required, in this very fine and, on the whole, well-managed river. The following is Mr. Frank Buckland's report on the Ribble for the year 1869-70 :—

REPORT ON THE RIBBLE SALMON FISHERIES, 1869-70.

"In my report for 1868 I fully described the weir at Low Moor, near Clitheroe, the property of Mr. Thomas Garnett. I then stated, that Mr. Garnett had informed me that 'he was, and always had been, desirous that the weir at Clitheroe should have as good a fish-pass attached to it as could be devised, provided that the fish-pass did not affect the stability of the weir or the supply of water to the works, and, at the same time, had the sanction of the secretary of State.' My colleague and myself had an interview, during last summer, with Mr. Garnett and his sons at the weir. The secretary of the Board of Conservators was also present. At that time and place a plan was settled upon to make the weir passable for the fish. Below the weir itself is a plateau of rocks, and upon these rocks some large balks of wood had been fixed by Mr. Garnett, according to the photograph and model exhibited by myself before the Select Committee of the House of Commons. The position of these balks has now been readjusted, additional balks have been placed on the top of some of the original balks, and others have been affixed by their sides, so as to form very large pools of considerable depth.

"The hatchway now in position opens by means of a hinge, like the blade of a knife: the weather did not permit this to be altered according to our plans during the last season; but directly the water goes down, this hatchway will be altered in such a manner as to be opened *sideways* on a slide, by means of a cogwheel and spindle, so as to command just sufficient water to fill the pools. In fact, it will act as a flood-guard, allowing the pools to be filled, but no more—a great improvement upon the old hatchway on the weir. The predominant current, according to our new plan, now meets the salmon as they ascend the middle of the river; and when there is a fair spate in the river the fish will have two roads from the pools, either by going through the movable hatch at the top of the weir, or by jumping the weir itself from the second pool, as the height of the weir is considerably diminished by the action of the balks.

"My colleague and myself have advised the Home Secretary to approve this pass, subject to minor alterations; and with the full understanding that this approval does not in any way give the right of fishing within fifty yards of the dam. I take this opportunity of thanking Mr. Garnett and his sons for the manner in which they have met our proposals, and have rendered us every facility in carrying out the new plans.

* Ninth Annual Report of the Inspectors of Salmon Fisheries (England and Wales) 1870, p. 69.

"I have a second time, in conjunction with my colleague, examined the weir at Settle. This is an upright weir, five feet high, with no pool at the base. It would not be a very difficult task to pass the fish over this weir ; but on the whole, we both agree that it would be not advisable to pass the fish higher up the Ribble than Settle. The reasons are—1st, That there is another formidable weir just above, which diverts nearly the whole of the river for the use of the mill ; 2nd, Poaching ; 3rd, A natural waterfall at Stainforth, so that any spawning fish let above Settle would, with their fry, probably be lost to the river.

"By the report of the conservators it will be seen that about 6852 salmon—a very satisfactory produce for this noble little river—were caught in 1869 ; it would produce a great many more fish, but for the pollutions. I also agree with the suggestion of the Conservators, that the weekly close time requires alteration, as the fish coming in from the sea hang about the estuary, and are there caught by the nets. This is particularly the case when the water coming down the river is small in quantity, and of not sufficiently low temperature to tempt the fish to ascend.

"The following note from one of the conservators confirms the success of the new pass in the Ribble at Clitheroe :—'February, 14, 1870. You will be pleased to hear that the fish-pass which has just been finished on the Weir, at Low Moor, has proved a great success. The men who were at work on the pass declare, that they saw the fish ascend and get through as if no obstacle interfered with them at all, and I have been told by our superintendent, and also by another water-bailiff who spent several hours watching the pass, that large fish passed up easily. The water bailiffs report more spawning fish in the upper waters (especially of the Ribble) than have ever been known before. This promises well for the future.'

The Smaller Yorkshire Streams, which flow towards the Irish Sea.—In addition to the river Ribble, several smaller streams, rising in the western hills, flow into the Irish Sea. The number, however, is not great, nor are the streams generally of much importance. In those remote ages in which the western limits of the county of York, and the eastern limits of the county of Lancaster, were fixed, the line of demarkation adopted seems generally to have been that formed by the change in the watershed on the top of the Penine chain. There were, however, a few exceptions in addition to that of the Ribble. Amongst these were the small streams, named the river Rawthey and the river Dee, on the northern limits of the West Riding, which flow down by Sedbergh into the Lancashire Lune ; and the rivers Greta and Wenning, which also flow into the Lune, in the lower part of its course. Also the river Hodder, which rises in Yorkshire, and forms the boundary of Yorkshire and Lancashire to the neighbourhood of Great Mitton, where it falls into the Ribble ; and further south, the river Tame, which flows through the manufacturing district of Saddleworth, turning a great number of mills before it enters Lancashire, where it ultimately discharges its waters into the Mersey.

Having described all the principal rivers that flow from the western hills of Yorkshire, both into the Irish Sea and into the

Humber, we now proceed to describe the river Derwent, the only river of any great magnitude which enters the Ouse from the East Riding of Yorkshire.

The River Derwent.—The river Derwent, the eighth great tributary of the Ouse, rises near to the German Ocean, between Scarborough and Whitby, within a few miles of the sea, which, however, it does not reach until it has made a winding course inland of nearly a hundred miles. The whole slope of the land is from east to west, in this part of Yorkshire, carrying the waters of great part of the North Riding, and nearly the whole of those of the East, from the coast into the interior, and then causing them to flow southward, down the great central valley of Yorkshire into the river Ouse, and ultimately into the Humber and the German Ocean.

The river Derwent drains an area of about 870 square miles. The name of Derwent is given to several English rivers, one of which feeds the lake of Derwentwater, in one of the most beautiful hollows of the Cumberland mountains; another flows from the chalk hills of Kent into the Thames, as the Darrent; whilst a much larger stream, the Yorkshire Derwent, rises amongst the hills of the North Riding, and flows into the river Ouse. Professor Phillips derives the name of Derwent from British words meaning "fair water," a very appropriate origin. A more recent writer derives the word Derwent from the British words *Dur-Gwent*, or "the water of highlands"—a name also very appropriate to the Derwent, in the first part of its course,* but not agreeing with the learned author of "Words and Places," who makes the word *Gwent* signify "a plain," in the ancient British language.

The sources of the Derwent are near Lilla Howe, between the Wykeham High Moors and the Burn Howe Rigg, a few miles north-west of Scarborough, in a wild, thinly-peopled country, about 600 feet above the German Ocean, which is only a few miles distant to the east. In the first few miles of its course the Derwent flows eastward towards the sea, to the foot of Harwood Dale Moor, but is suddenly turned by the high land at High Langdale End, and forced almost due south, by the cliffs at Hackness Moor on the east, and a corresponding range on the west, which carry it down through a deep woody valley to Low Langdale End, where it again winds to the east, under the Red Brow plantation, to Hackness.

* Phillips' *Yorkshire*, p. 199; J. P. Fleming's *Analysis of the English Language*, 1869.

There it flows down past the seat of Sir Harcourt Johnstone, Bart., M.P. for Scarborough, winding through the beautiful grounds of Hackness, and forming one of the great charms of that wild and beautiful scenery. After passing Hackness the course of the Derwent is turned southward by Suffield Heights, down the Forge valley to East and West Ayton. Here the stream approaches within a few miles of the sea; but is effectually kept from reaching it by the high downs covered with tumuli, and the remains of ancient camps, which lie between East Ayton and Scarborough. From this point the river flows rapidly southward into the deep, moist valley, over the marshy and often flooded land known as the Cars, where it receives the river Hertford—a small stream which rises within two or three hundred yards of the sea at Filey, but flows directly away from the sea through a deep valley, through which an artificial channel, named the New Hertford River, has been formed through the Car or marsh lands, to prevent the flooding of the valley. This artificial river joins the Derwent below Binnington Car, and is continued westward into the interior, following the windings of the river Derwent through the Cars to Foulbridge and Yeddingham, with its remains of the ancient abbey. From Yeddingham the Derwent flows east by south, through a very moist country, down to Low Newstead Grange, where it begins to wind to the south. There, at Ryemouth, the river Derwent, flowing from the north-east, meets the river Rye flowing from the west, and bringing with it the whole of the waters which run from the Cleveland Hills, on the south side of that extensive range.

Rye Mouth, the point where these streams meet, stands a few miles above the narrow pass at Malton, through which all the waters of this district flow southward towards the Ouse and the Humber. Professor Phillips and other eminent geologists have shown, that this is the only pass through which the waters of this portion of the North Riding can escape into the sea. To the north, east, and west, the rise of the land from which the Derwent and the Rye descend is so great as to prevent the escape of the water in those directions; whilst on the south there is a range of hills, several hundred feet high, which just as effectually prevents the escape of the waters southward, except through the narrow pass at which the town of New Malton has been built, close to the site of a Roman camp, which formerly commanded this strong military position.

On the right, or west side, of the Roman camp standing on the east side of New Malton, the land rises to a height of 164 feet, in what are called the Old Malton fields, and from this point a range of hills extends eastward. Those at Barton-le-Street rise 186 feet, at Hovingham 299 feet, and in the hills to the south of Gilling Park, to 439 feet, beyond which point they continue to rise until they reach the highest points of the Cleveland range. On the other side of the southern boundary of the valley of the Derwent, the land begins to rise almost immediately at Settrington and Scagglethorpe, and soon attains to the height of several hundred feet. These heights extend eastward to Thorpe Basset Wold, from which point a line of chalk wolds, everywhere many hundred feet high, runs to the sea at Flamborough Head. Upon the line of the river Derwent at Malton the height above the level of the sea is less than seventy to eighty feet, and through this narrow pass all the waters of the Derwent, swollen by those of the river Rye, flow southward. The vallies from which they descend must in very remote times have been a great lake, and afterwards a great and extensive range of swamps, of which the Car land preserves both the memory and the ancient British name; Car being the old Celtic name for a "pool" or a swamp.

The River Rye.—The river Rye is the largest tributary of the Derwent. It rises at the head of Ryedale, on the heights of Rivaulx Moor, to the north of Helmsley. In flowing down this beautiful valley it passes by the remains of Rivaulx Abbey, a noble ruin commanding most magnificent views from the adjoining terrace walk. Passing down the valley, it winds round Duncombe Park, the residence of the earl of Feversham, one of the most beautiful seats in Yorkshire. The Rye then runs round the base of the old castle of Helmsley, "proud Buckingham's delight," and then winds with a south-easterly course through a level country by Nunnington, to Water Homes, where it receives two large streams flowing from the Cleveland hills, one named the Riccal river, and the other the river Dove. The former of these flows down from behind Helmsley, the latter from the neighbourhood of Kirkby. After passing Brawby the river Rye receives another stream named the river Seven, which flows down from the neighbourhood of Sinnington, and a little lower the waters of Costa beck, which bring down all the waters of the floods from the moors beyond. These enter the river Rye near Little Hebden and Howe Bridge, and swell its waters, so that when it joins

the river Derwent a few miles further south-east, at Rye Mouth, it swells that river into a large stream. It is, in fact, the only outlet for the waters of this district.

From Malton the Derwent flows southward through a comparatively level country, passing the remains of Kirkham Priory, erected in the twelfth century by Walter l'Espée. Rich beds of ironstone have recently been found in the upper Oolitic series of the beautiful vale of Kirkham, on the estate of Mr. Clough Taylor, of Kirkham Abbey, and also upon the estates of the earl of Carlisle, on the opposite side of the vale.*

At Stamford Bridge the Derwent flows over the scene of the great victory gained by the Saxons under Harold, the last of the Saxon kings, over the invading Northmen, and their traitorous ally Tostig, the deposed earl of Northumberland, and the brother of King Harold.

From Stamford Bridge the Derwent flows almost due south to its junction with the river Ouse, receiving several small streams from the hills of the East Riding. In its course it passes Elvington and Ellerton Priory, and considerably lower down the stream, Wresill Castle—an ancient place of strength of the Percys, earls of Northumberland, who at one time were almost as powerful in the East Riding as they were on the borders of Scotland.

The Derwent runs almost due south by Elvington and Stone-upon-Derwent. Further south are the remains of Thicket Priory, and villages of Thorganby, Bubwith, and Menthorpe. To the right of these villages is Eserick Hall, the seat of Lord Wenlock. A little further south the Derwent enters the river Ouse at Derwent Mouth, after a course of upwards of seventy-two miles.

Fisheries of the Rivers Derwent and Rye.—At the inquiry as to the state of the salmon fisheries made in the year 1861, the Honourable and Rev. Stephen Lawley gave the following account of the fishery of the Derwent, in answer to the questions of the chairman.

"13,549 (Chairman). Where do you reside? I reside at Eserick, six miles south of York, between the Ouse and the Derwent. I can speak of a small fishery on the Derwent, ten miles in extent, part belonging to Lord Wenlock, and part to General Clargis and other proprietors; and my brother, with Mr. Rudston Read, have taken the fishery together. Mr. Ashworth has been misinformed about the quantity of fish taken in the Derwent this year; he stated it to be three fish. There were thirty-one fish, weighing 280 lbs., taken in the whole length of the fishery. I speak of that part of the fishery of the Derwent which is below, and inclusive

* *Times*, July 1, 1870.

of, the first impediment to the fish ; so that I speak of the tidal fishery where the fish can come up, and where they meet with their first weir or dam upon the Derwent, which belongs to Lord St. Vincent.

"13,550. How is that fishery worked ? With a sweep net ; I have tried it with a fly, but it is a little too muddy.

"13,551. Is any part of it let ? No ; my brother and Mr. Read have taken the whole of the ten miles of fishery, and we keep it in our own hands. As I have stated, we have taken only thirty-one fish, whereas, in Lord Wenlock's fisheries, comprising one half of the water, ten years ago we took a larger quantity of fish.

"13,552. To what do you attribute the decrease ? To late closing and to weirs, the fish not being able to get higher up the river ; there are two dams, one at Sutton, and one above at Stamford Bridge, where the fish are caught out of season ; they are not able to escape.

"13,553. Is there any obstruction between your fishery and the sea ? No."

William Cayley Worsley, Esq., spoke with regard to the fishing of the Derwent, and the Rye, one of the principal feeders of the Derwent, in answer to questions asked by the chairman of the Commissioners :—

"13,577. Where do you reside ? At Hovingham in the North Riding. What I have to say is with respect to the Derwent. I have learned from Mr. Harcourt Johnstone, who is acquainted with the fresh waters of that river, that there is a stream called Scorby in that region, which runs into the sea, and occasionally salmon might get into the head water of the Derwent through that channel. I am personally more prepared to speak of the river Rye than the Derwent. The Rye rises in Bilsdale, and comes into the Derwent somewhere adjacent to Malton. Now, the Rye is a river up which salmon occasionally come when they have a chance to get by the weir dams below. I know that it is a very fine stream naturally for breeding salmon ; it is full of fine shallows, with gravelly and sandy bottoms, and the water is as pure as can be ; there are besides many tributaries connected with the Rye in the higher regions, which are perfectly pure streams, and well suited to the breeding of salmon. I am persuaded in my own mind that the scarcity of salmon there this year is almost wholly attributable to the dams below, which prevent the fish getting up.

"13,578. Do you know the dams on the Rye itself ? There is one at Nunnington, but I do not attribute so much injury to that as to the lower ones ; at the same time it should be dealt with in general ; fish get over, but only in a flood.

"13,579. Are there any fish traps in the Rye ? Fish I know are caught occasionally at Nunnington (I am not aware that there is a fishery there), owing to their detention under the weirs. My own individual opinion is that the great evil exists lower down, and that to cure the thing you must go to the bottom."

William Frederick Rawdon, Esq., chairman of the Rye Fishery, also gave the following evidence in reply to the chairman.

"13,580 (Chairman). Are you chairman to the Rye Fishing Club. Yes.

"13,581. How long have you been acquainted with the Rye ? I have fished the river for twenty-five years, more or less.

"13,582. How long has your association existed ? From eighteen to twenty years.

"13,583. Is it supported by voluntary contributions ? Yes ; it was instituted with a view to the preservation of the river for angling, for trout more especially, and there is also grayling in abundance. We have had a meeting of our committee on this subject, and I will, with the permission of the Commissioners, read the statement to which we have agreed."

The witness read the same as follows :—

"November 7, 1860.—At a meeting of the committee of the Ryedale Anglers' Club, held at Mr. Watson's chambers, Coney Street, York: present, Mr. Rawdon in the chair, the following report and resolutions were agreed to :—

"The river Rye rises in the moors in Bilsdale, in the North Riding, and comprises several tributaries; viz., the Seph, the Riccal, the Dove, the Hough, and the Seven, all affording spawning-grounds for salmon, and communicates with the Derwent, near Rillington. There are several minor obstructions in the Rye and its tributaries to the passage of salmon; but the principal are in the Derwent. The Derwent, below its junction with the Rye, is not navigable above Malton, but it is so between Malton and the junction of the Derwent with the Ouse. The Ouse from thence is tidal. The river Rye is unquestionably a salmon-breeding river. For the purpose of enabling the fish to ascend this river, steps, slopes, ladders, and other facilities over all dams and artificial obstructions require to be erected, for facilitating their ascent to the spawning grounds. We may name that the main obstructions exist at the following places :—Sutton-on-Derwent, Stamford Bridge, Kirkham, Old Malton, Nunnington, Duncombe Park, Buttercrambe Dam. We strongly recommend—1. Abolition of bag and stake nets, and all fixed contrivances for taking salmon, both in fresh and salt water. 2. Weekly close time from six p.m. on Saturday to six a.m. on Monday, for both nets and rods. 3. Annual close time for nets from the 11th of September to the 15th of February. 4. Annual close time for rods from the 15th of October to the 15th of February, and that it be illegal to have salmon spawn in possession. 5. A license on all salmon fishing, together with fines, to be applied to conservancy purposes. And, finally, this meeting is of opinion that the preservation of salmon is of national importance, as a question of food for the people, and that some such measures as are above suggested are essentially necessary to carry out the object in view.—W. F. Rawdon, chairman."

Recommendations of the Yorkshire Salmon Fishery Conservators, 1869.—A meeting of the Board of Conservators of the Wharfe, Nidd, Ure, Swale, and Ouse fishery district, was held at the Guildhall, York, Lieut.-Col. Haworth Booth in the chair, in November, 1869. The report, which was read by Mr. J. H. Phillips, the secretary, stated that the amendment of the present salmon fishery laws was now exciting general attention, and was asked for by every board in the kingdom. In the last session of Parliament a select committee was appointed to inquire into the present state of the fishery laws, and to report to the House of Commons what amendments were required, but they were unable to complete their inquiry. The board expressed their earnest hope that this committee would be re-appointed next session;* that a bill founded on the evidence would be introduced, and result in the passing of an effective measure, the necessity for which became daily more apparent. The report complained that every salmon river in the county was lamentably blocked with locks and obstructions of various kinds; and hence it was only during irregular, and sometimes far apart floods, that salmon were enabled to surmount these barriers. Referring to the inquiry made nearly a year ago,

* This has been done since the meeting of Parliament this year (1870), and much additional evidence has been taken

by the special commissioners, into the legality of the fishing mill dams on the Wharfe, confining themselves to the first four—viz., Tadcaster, Thorpe-Arch, Flint, and Wetherby—it was observed that the inquiry was adjourned for the purpose of conferring with the owners. Mr. Hatfield promised that effective ladders should be made, at his own cost, at Thorpe-Arch and Flint. The Leeds Corporation had, in a very generous spirit, instructed their engineer to commence the making of the pass at Wetherby, entirely at their own cost, as soon as suitable weather arrived in the spring of next year (1870). The report showed that more fish, and of greater weight, had been taken this year than in 1868. The board protested against the discharge of the sewage of the town of Otley into the Wharfe. The board begged to impress on the legislature the absolute necessity for an amendment of the law, so as to make it compulsory on the owners of mills to provide openings on fish-ways over all weirs, from the estuary to the source of every salmon river.

The River Tees.—Having described the course of the numerous rivers of Yorkshire which run into the Ouse and the Humber, and also that of the streams which rise in this county and discharge their waters into the Irish Sea, we proceed to notice the rivers that flow with an eastern course into the German Ocean. We commence with the river Tees, forming the northern boundary of the county of York.

The Tees rises amongst the wild moors and limestone cliffs of Milburn Forest, on the borders of Westmoreland, at an elevation of about 2000 feet. The length of its course is 95 miles, and the area of the country which it drains 744 square miles, from its source at Cross Fell, to its mouth, a few miles below Middlesborough. In the course of its progress to the sea it receives the waters of the Skerne river, $30\frac{3}{4}$ miles in length; the Lune river (Yorkshire) $12\frac{3}{4}$ miles; the Balder river; the Greta river, 16 miles; the Leven river, 23 miles; the Langley Aldwent beck, 11 miles in length; the Deepdale beck, $10\frac{1}{2}$ miles; the Northburn beck, $8\frac{1}{2}$ miles; the East Shun, $7\frac{1}{2}$ miles; the Maize beck, $6\frac{3}{4}$ miles; and the Harwood beck, $5\frac{1}{2}$ miles.

After rushing through a narrow cleft in the rocks with immense rapidity, at what is called the Weel, or perhaps the Whirl, the river receives the Maize Brook, and becomes the northern limit of the county of York, entering that county at an elevation

of 1500 feet above the level of the sea. Even at this elevation there is a population around the lead mines and the slate quarries, which yield the most valuable products of the district. From these heights the river rushes rapidly forward, throwing itself over the rocks of High Force, and forming a cataract nearly seventy feet in height, surrounded by dark rocks and shaded by mountain trees. Rushing down another cataract at Low Force, the river passes below Winch foot-bridge, built for the accommodation of the miners, and leaving the open moors enters the inclosed country at Holwich Pries. A fringe of pasture-land marks the course of the stream from this point, with occasional woods where there is any depth of soil; but a scar, rising to nearly 1000 feet above the level of the sea, and many hundred feet above the stream, closes in the ravine.

At Middleton Bridge the river is still more than 700 feet above the level of the sea; and in its course eastward continues to receive numerous streams from the hills. Amongst them is a small stream known as the river Lune, which rises at Lune head and runs down the Yorkshire Lunedale, a green valley in the moors, into the Tees; bringing down with it the waters of Mickle-fell, the highest mountain in Yorkshire.

From this point the Tees again flows amongst woods and below rocky scars, turning Collingwood corn-mill, and running under Eggleston Bridge, at an elevation of 621 feet above the level of the sea. Hence it passes on to Romaldkirk, with its ancient church and village, and flows, with graceful windings, to Balderfoot. There it receives the Balder river, supposed to have been named after one of the gods of our pagan ancestors, if not after the ancient Baal, the god of the sun. Further down, the Tees passes Cotherstone corn-mill, and leaves the site of Cotherstone Castle and village, with its industrious population and its churches and chapels, to the south. From Romaldkirk to Croft Bridge the country traversed by the Tees is still mountainous, rising both on the north and the south to elevations of from 1000 to 1500 feet. The Roman road runs up Teesdale on the south side of the river, by Hutton Moor, Greta Bridge, and Rokeby Park, to Bowes, supposed to be the site of the Roman Lavatra. Before reaching Barnard Castle the Tees is crossed by the South Durham and Lancashire Union Railway, leading to Bishop Auckland and the system of the Durham railways. Thence it flows down to Barnard Castle, formerly a place

of great strength, and still the most populous town in this part of Teesdale. A short distance below Barnard Castle is Egglestone Abbey, close to the point where Thoresgill beck enters the Tees. Here commence the woods of Rokeby Park, one of the most beautiful of the many beautiful scenes of Yorkshire, reaching to the point where the river Greta enters the Tees, at the foot of Mortham bank and Mortham tower, rendered more interesting by the beautiful poetry of Sir Walter Scott's "Rokeby."

A little lower down the stream is Wycliffe with its rectory, its hall, its wood, and its ancient camp, but still more celebrated as the birthplace of the great reformer, John Wycliffe. Below Wycliffe the river flows eastward, past the supposed site of Old Richmond, with St. Lawrence's chapel in ruins; near this point the Darlington and Barnard Castle Railway crosses the river. Lower down is Pierce Bridge, with its Roman station on the Tees, and the remains of the Roman road, running due north and south, and crossing the river at this point. A little to the south-east is Stanwick Park, which probably takes its name from the Stoneway, and also Forcett Park, and Carlton Park. From Pierce Bridge to Croft Bridge the Tees flows through meadows, with many windings, by High Coniscliffe, Low Coniscliffe, Cleasby, and Stapleton. At Yarm it is crossed by the North-eastern Railway, which runs almost due north to Stockton. The Tees reaches the same place, though after numerous windings through the Holmes, the Rings, and other meadows. Before reaching the sea it receives the river Leven, a beautiful winding stream flowing from the hills of Cleveland. At Stockton, which stands on the north side of the river, the Tees is navigable for large vessels, and continues so down to Middlesborough, flowing through marshes and meadows to the sea. It is already the port and capital of the iron district of North Yorkshire. Below Middlesborough the Tees widens, and enters the German Ocean, after a course of ninety-five miles.

The Salmon Fishery of the River Tees.—The salmon fishery of the river Tees is the most productive of the river fisheries of Yorkshire, and is scarcely surpassed by that of any other salmon river in England. It has every natural advantage, the Tees rising in a mountainous and thinly peopled country, receiving numerous and beautiful streams at every part of its course, and being comparatively free from the nuisances which interfere with the productiveness of other rivers. In very favourable years, such as 1867, as many as 10,000

salmon are said to have been caught in the Tees, and it is believed that with improved management the fishing might be rendered still more productive.*

The following evidence, as to the advantages of the river Tees as a salmon fishing river, was given before the commissioners appointed to inquire into the state of that fishery in November, 1860, by Joseph Dodds, Esq., the present member for the borough of Stockton. Mr. Dodds, speaking of the Tees as a salmon river, said :—

“With respect to the natural character of the river, it is in every respect most favourable. The river has its source in the mountains of Westmoreland and Cumberland, some hundred miles from the sea, and for about twenty miles flows through a moorland district, after which it passes through a highly-cultivated agricultural district, and finally discharges into the German Ocean. The area drained by the Tees comprises about 700 square miles. I thought it might be useful to place before you the fall from near the head of the river to the sea, and I have prepared from the Ordnance map a statement showing the fall in various sections, from the head of that part of the stream which is known as the Weel. It may be thus summarized :—

	Distance.			Fall.
	Miles.	Fur.		
To the foot of the High Force,	9	0		546 feet.
To Middleton Bridge,	5	4		336 “
To Gainford,	19	3		461 “
To Croft Bridge,	13	4		150 “
To the foot of Dinsdale Lock,	12	1		80 “
To limit of tidal flow,	5	2		8 “
To Tees Mouth,	25	0		16½ “
	89	6		1597½

“The bed of the river, for its whole course above the tidal limits, is either rock or gravel, principally gravel, streams and pools alternating: in all respects most suitable for the breeding and propagation of fish. Then there are several tributary streams. The principal of them on the Yorkshire side are the river Lune, the river Balder, Deepdale beck, the river Greta, the Clow beck, and the river Leven. On the Durham side there are Ettersgill beck, Bow beck, New Biggen beck, Hudshope beck, Egglestone

* Ninth Annual Report of Inspectors of Salmon Fisheries, 1870, p. 68.

burn, Staindrop or Grand beck, the river Skerne, Norton or Lustrun beck, Billingham beck, and Greatham beck.

The same witness (Mr. Dodds), addressing the commissioners as to the natural or artificial obstructions to the ascent or descent of the fish, said—"The only natural obstruction which becomes an actual barrier to the ascent of the fish up the river Tees is the High Force, a cataract of about seventy feet in height, situated about eighty miles from the mouth of the river, and about twenty miles below its source. There is a smaller obstruction within a couple of miles of it, near a place called Winch-bridge, but that scarcely forms an actual barrier to the ascent of the fish. These two are the only natural obstructions which form an actual barrier to the ascent of the fish. Then, as to the artificial obstructions; they are, first, the stake nets on the sea-shore, to which I have already referred; secondly, the various mill-races, weirs or dams, and locks or traps, of which there are several between the limit of the tidal flow and the High Force. The principal of these is situated at Dinsdale Fish Lock, and it has existed for a great number of years—I believe, for several centuries—and no doubt, forms the principal artificial impediment to the progress of the fish up the river. When the fish are running up to the spawning beds in the upper part of the river a little before the present time, they are congregated by hundreds in the pools between the mill-dam and the limit of the tidal flow, a distance of about five miles. The facilities for poaching which exist in that five miles of water are so great, that a gentleman resident in the neighbourhood has repeatedly stated to me—"The great temptations to poaching here are beyond the power of human nature to resist."

The witness added, "I am prepared to prove that one man, in one night, frequently took from ten to fifteen or twenty stone of fish out of those pools, night after night, for weeks together. The fish are sold, partly in the neighbourhood, to agricultural servants, and so on. I think I could prove cases where families have existed for weeks together on them; they purchase the fish at threepence a pound. A good deal is sent away to a distance; I believe, in the first instance to Newcastle, and thence to London and the south, where it is converted into kippered salmon, and afterwards sold to the public as kipper. The spawn from these fish is sold for the purpose of manufacturing into fish bait, and produces about 3s. 6d. a pound.

There are several men who are known in the neighbourhood to exist entirely in that way. Then, as to our mill-races and fish-locks, there are from twelve to fifteen altogether; these are artificial obstructions, to a greater or less extent, to the ascent of the fish. Most of the mill-races have locks, in which the fish are captured, and many are entirely illegal."

In the last report on the salmon fisheries of England and Wales, 1870, Mr. Buckland proposes that the conservators should purchase Dinsdale Dam, which is private property, and has existed for a long course of years, and should pull it down. "This," he says, "will be the least expensive and readiest solution of the question, for all parties concerned."*

The River Esk rises in the highest parts of the Cleveland Hills, in some small streams named Esklets, between Farndale Moor, 1342 feet, and Westerdale Moor, 1336 feet in height; and flows down to the site of an ancient British camp. Thence it runs towards the sea with an easterly course, receiving numerous streams from the north and south. It is, in fact, the only outlet for the streams of this mountainous range. After passing to the south of Egton, leaving the remains of a Roman camp to the right, it flows to Whitby, whose existence as a harbour depends in a great measure on the influence, past and present, of the waters of the Esk.

The Salmon Fishery of Yorkshire Esk.—In the ninth report, 1870, of the English salmon fisheries, Mr. Walpole gives the following account of the fishery of the Esk:—

"I am afraid that I am myself partly to blame for the circumstance, that for five years no specific report has been made on the Esk; yet the qualifications of 'that brilliant little river,' and the attention which an association of gentlemen has paid to its preservation, were deserving of better treatment. Though only a comparatively small stream, it possesses qualifications, in a salmon sense, of a high order. There is an abundance of spawning ground of a very fair character, and the fords are separated by excellent pools, which ought to make the river—what small rivers are not always—a good angling stream. Seven weirs bar the passage of the river. At the first, at Ruswarp, the association, at my suggestion, have placed a board diagonally across, with, as I am told, satisfactory results. The second, at Sleights, has been provided with an excellent pass, on the pool system, formed in an old curve on the left side of the river. The third, a fishing weir, offers no obstruction to fish. The fourth, fifth, and sixth, Egton Bridge, Glaisdale Ironworks, and Glaisdale Mill weirs, are very slight obstructions; but the seventh, at Lealholm Bridge, requires a pass, and I have pointed out to the Esk Association the manner in which a pass could be effectually made.

"Only two other matters remain for consideration. The Esk, like many rivers on the east of England, is full of bull trout; and the association are attempting to restore by artificial breeding the true salmon to the river. The other matter for special consideration is the fact that the Esk has not hitherto been formed into a fishery district. The association conceives

* Ninth Annual Report of the Inspectors of Salmon Fisheries (England and Wales) p. 27.

that the small proprietors who abound on the banks of the river might possibly object to an organization which they might, however causelessly, fancy would interfere with their own privilege as 'brinkers.' If, however, the success which has hitherto attended the efforts of the association continue, it is demonstrable that in their own protection these small proprietors must have recourse to the organization which the law has created with this object, as otherwise the rewards to which they themselves are entitled for their exertions, will be reaped by the public fishermen, who have not participated in the task of protection, fishing out at sea."*

Along the whole of the Yorkshire coast from the mouth of the Esk, at Whitby, to the entrance of the Humber, a distance of seventy or eighty miles, not a single stream flows into the sea, which is of sufficient magnitude to be described as a river. In general, the land rises so rapidly, either immediately on the sea-coast, or within a few miles of it, as to cut off all access of distant streams to the sea. But in the place of a few large rivers, great numbers of small brooks rush down the eastern front of the land along the coast, and discharge themselves into the sea, after a rapid course of a few miles. Several of the streams have force enough to turn a mill, and many of them have cut small creeks in the shore, into which fishing boats enter at low water; but there is nowhere that struggle between the tides of the sea and the waters of the interior, which produces deep water, except at the mouths of the three rivers, the Tees, the Esk, and the Humber.

The Gypseys.—Amongst the most curious streams which flow into the sea along the eastern coast are the intermittent brooks, known as Gypseys. These burst forth chiefly, if not exclusively, amongst the chalk hills running inland from Flamborough Head and Bridlington. The most celebrated of these streams rises at Wold Newton, and flows down by Rudston and Boynton to the sea, at Bridlington Quay. Another bursts out in wet seasons at Kilham.†

The River Hull.—The last river of Yorkshire that remains to be described is the river Hull, which, though small in extent, is one of the most important of the rivers of Yorkshire, being the chief instrument by which the port of Hull was originally formed, and to which it owes that great depth of water, that renders it accessible to the large ships of modern times. We have shown in the early part of this chapter how greatly the depth of water existing at the port of Hull surpasses the depth that is found at any other point in the Humber, the Ouse, and the Trent; and it is chiefly owing to the continual action of stream and tide, at the point at which the river

* Ninth Annual Report of the Inspectors of Salmon Fisheries (England and Wales). Pp. 62 and 63.

† Phillips' Yorkshire, p. 105.

Hull joins the Humber, that this depth of water has been produced, which gives to the whole county of York, and to many districts beyond it, the great advantages of a first-rate port. We shall show in the course of this work how much modern skill and science, applied to the port of Hull, have done to preserve and extend the advantages conferred by natural causes.

The river Hull is formed by three brooks which unite their waters near Great Driffield. The rain-fall in the hills beyond Driffield is very heavy during storms, and a large quantity of water is discharged by the river Hull, although its stream is rather narrow. It flows down to the south of Beverley, receiving numerous small streams on both sides, and ultimately discharges itself into the Humber at Hull, or Kingston-upon-Hull, according to its ancient name.

The Floods of the Yorkshire Rivers.—All the rivers of Yorkshire, rising in mountainous or hilly districts, are subject to great floods after heavy rains. The greatest flood in the Yorkshire rivers that has been known for more than thirty years, occurred on Friday, 16th November, 1866, after a continuous rain of nearly twenty-four hours' duration. In this great flood every stream overflowed its banks, and all the valleys were inundated.

The river Don, which flows from the South Yorkshire hills, passing through Rotherham, Sheffield, and Doncaster, began to rise on Thursday night, and on Friday overflowed its banks along the whole of the lower part of its course. A bridge was washed away at Hill-foot; in the town of Sheffield, the works of Messrs. Vickers were flooded, and several of the roads in the lower parts of the town were impassable. The water ran as high, within a few inches, as on the occasion of the great flood caused by the bursting of the Bradfield reservoir. At Doncaster, also, all the lowlands were flooded.

The river Calder overflowed its banks from Todmorden, where it enters Yorkshire, to Castleford, where it flows into the river Aire. The whole country was under water along the valley, and the railway trains were unable to run for several hours, owing to the flood at the end of the Summit tunnel. The flood was very destructive at Mirfield, Dewsbury, and Wakefield. At Sowerby Bridge the stream rose between seven and eight feet, and all the mills and warehouses adjoining the river were flooded. The stream named the Rhyburn, that flows down the beautiful valley of Ripponden and joins the Calder at Sowerby Bridge, was excessively flooded; and here a

woman and three children were drowned. By the carrying away of the bridge across the Rhyburn the greatest alarm existed in the Black Brook valley, lest the reservoir at Deanhead, at the top of the valley, should burst; but happily it was strong enough to resist the force of the water.

On the river Calder, near Dewsbury, a cart with three persons in it was carried off the road by the floods into the river, and all three perished. At Wakefield, property to the value of upwards of £50,000 was destroyed. The number of persons drowned at Dewsbury by the overflow of the Calder is ascertained to have been seven.

The river Aire was flooded from above Skipton to the Ouse. A few miles above Leeds, at Apperley Bridge, a railway viaduct was carried away, after having stood for upwards of twenty years. The lower districts of Leeds were entirely under water, and there eight or ten persons perished by the breaking of a stage, which fell into the river with nearly twenty persons upon it. All, except one, were young girls.

The Ribble was much out at Settle, and all the way down to Clitheroe.

The river Wharfe, flowing through one of the most beautiful valleys in Yorkshire, was flooded along the whole of its course, from Craven to the point where it falls into the Ouse. At Arthington House, below the pumping station of the Leeds water-works, the flood was higher than it had been during twenty-five years preceding.

The river Ouse at York rose to the height of fifteen feet, being swollen by the waters of the rivers Ure, Nidd, and Swale, all of which run into it above the city. A great extent of land, through a large and valuable agricultural district, was also under water.

In the East and greater part of the North Riding, the floods were, if possible, more extensive and more destructive than those of the West Riding. Nearly the whole of the waters of the Cleveland district, and of the moors on the eastern side of the North Riding, are brought down by the rivers Rye and Hertford, and by numerous smaller streams, into the river Derwent, which carries their waters through the natural pass of Malton, down into the East Riding. From Malton to the river Ouse and the Humber, the country, as a whole, forms a great plain, through which the Derwent winds with numerous curves, ultimately reaching the Ouse at Derwent Mouth,

near Barmby. In these great floods nearly the whole of the valley of the Derwent was under water, and remained so several weeks. These floods, whenever they occur, are extremely destructive; and though the injury which they inflict is small, in comparison with the benefits derived from the rivers and streams which produce them, it is clear that there is still much to be done, in the way of constructing reservoirs and improved outlets for streams, before the whole benefits which they are capable of conferring will be realized without drawback. Considering how much this part of England, in common with the rest of the kingdom, has suffered during the last few years from the excessive dryness of the summers, as well as from the heavy floods of winter, it is worth while to consider whether some plan could not be devised, by which the land might be irrigated in summer with the surplus water which produces so much mischief in the winter months. This is done in the plains of Lombardy, so as to maintain a perpetual fertility through the driest summers; and there seems to be no reason why it should not be done in a district like Yorkshire, in which most of the streams flow from an elevation of 1000 to 2000 feet, in their course from the mountain tops to the sea. Something considerable has already been done, for the cars or carse land is partially rescued from the floods which formerly laid it waste every winter; but much is still required to be done for those, and the other low-lying lands of the county.

The river Trent overflowed its course from Staffordshire, through Derbyshire and Lincolnshire, to the point where it flows into the Humber. This river, like the Yorkshire rivers, brings down the drainage of a very extensive mountain district, and is subject to great floods, especially in the lower part of its course. When not flooded, the depth of the Trent is less than might have been expected from the extent of country which it drains, though it is naturally navigable for small vessels above Newark, and has been rendered so by art to the borders of Staffordshire.

The Sea-coasts, Ports, and Harbours of Yorkshire.—Great as are the natural advantages which Yorkshire possesses in its soil, its climate, its minerals, its rivers, its manufactures, and its agriculture, these advantages would have been much more slowly developed if it had not possessed seaports capable of receiving vessels large enough to carry on an extensive commerce, not only with the shores of Europe, but with every part of the world which can supply this country with food and raw materials in exchange

for its minerals and manufactures. In this respect Yorkshire has a great superiority over the counties extending from the Humber to the Thames, which have few good ports, and are to a great extent destitute of commerce with foreign countries, as well as of internal manufactures.

The principal seaports of Yorkshire are at the entrances of the rivers and estuaries. They are few in number, there being only three ports, formed by the opening of the rivers, though one of them is amongst the greatest and best ports in England. The first of these is that formed by the entrance of the river Tees, in the neighbourhood of Middlesborough; the second, that formed by the river Esk, at Whitby; and the third that formed by the Humber, which receives pretty nearly all the other waters of Yorkshire. The port of Hull possesses a commerce which ranks next to that of London and of Liverpool. Scarborough, though more indebted to the beauty of its scenery and its many attractions than to its external trade, has a fair port, immediately on the sea-coast; and that is also the case with Bridlington.

Middlesborough, at the entrance of the river Tees, is the chief port on the northern coast of Yorkshire, contains a population of nearly 20,000 inhabitants, and owes its prosperity to its position on the sea, and to its proximity to the great iron district of Cleveland. It stands on a level winding coast, with a good depth of water in its sea channels, and secure shelter from the storms of the German Ocean; and it has docks, railways, and all the conveniences requisite for the conducting of modern commerce. We shall give a full account of the progress of Middlesborough, and the other seaports of Yorkshire, in a subsequent chapter of this work.

From the mouth of the Tees to the mouth of the Esk, at Whitby, the general line of the Yorkshire coast runs from west to east, with a slight tendency southward. The coast is generally rugged and inaccessible, with precipices rising at many places to the height of several hundred feet. Some of the bays along this coast are very beautiful, but none of them afford shelter for large vessels, being in general completely rock-bound. A considerable traffic in articles of local produce is carried on in some of the creeks.

Redcar is a favourite modern watering place, at the extreme northern point of the Yorkshire coast, near the spot where it

begins to bend towards the south-east. The shore here is very level, and the sands are fine. It is surrounded by rabbit warrens and sand hills, extending for some distance along the coast. Inland, at a little distance from the sea-shore, is Upleatham, and somewhat further is Guisborough. Here the land rises very rapidly, and several large becks, or brooks, run down to the shore, most of which meet at Saltburn.

A little below this point, the shore begins to rise rapidly into scars, or precipitous rocks. At Stone Gap the cliffs are 100 feet high; at the mouth of Skelton beck, rather more than 100 feet; and proceeding southward, at Hunccliffe, they rise to the height of 336 feet. This rise continues as the coast runs further out into the German Ocean, and at the Lofthouse Alumworks, near the shore, the flag-staff is fixed at a height of 625 feet above the level of the sea. A little further inland, Skelton Castle stands at an elevation of 247 feet, and from this point Skelton brook flows down into the sea, with a force sufficient to turn a corn mill in the valley. Proceeding along the coast, the rocks and cliffs at Easington are of the height of 550 feet; and the Watch-cliff Beacon, a little inland, rises to a height of 790 feet.

This latter rise in the elevation of the coast is caused or accompanied by an entire change in the geological formation. In the neighbourhood of Middlesborough the new red sandstone is the prevailing stratum, and, as usual, it rises to a very small height, being in general, indeed, more of a plain than of a hilly formation. But, at the point where the coast turns to the south-east, in the neighbourhood of Redcar, the Lias formation commences, rich with the ironstones of Cleveland, and presenting all the type fossils of that formation. Along this shore, in these rocks, are found extensive deposits of alum shale, and several alumworks have been constructed where the shale is most abundant.

The next great opening in the shore is at Skinningrove, at which point numerous becks or burns unite, and cut their way through the Lias strata. From Blue Nook on the sea-shore, to the shipping place at Staithes, the shore is lined with cliffs, rising two or three hundred feet above the level of the sea. Here also numerous becks or burns unite, and form a wide water-course, through which the streams force their way into the sea at Staithes, cutting away the cliffs. All along the coast the cliffs continue at the White Stones, the Beck Scar, the Staithes Nab, and the Old Nab, Brackenbury,

and Lingrow Nook, to the semicircular bay of Runswick. At Runswick the cliffs are several hundred feet high, and still higher in the neighbourhood of Goldstead. Here, however, are beautiful sands at the foot of the cliffs.

Turning to the south the cliffs still continue; Ovalgale Cliff being 340 feet high, and Sandsend Ness, close to the alumworks, 250 feet. From Sandsend Wyke, or Dunsley Bay, to Whitby the shore consists of cliffs from fifty to a hundred feet high. On the whole of this coast the Lias rocks prevail, but they only form a narrow fringe; the Oolite approaching within a mile or two of the sea, and being only separated from it by the Lias cliffs.

Whitby is built in the hollow cut by the waters of the river Esk, and by the tides of the sea. Numerous streams flow into the river from the Cleveland Hills, and bring down immense masses of water after heavy rains. Whitby is the only place of safety for shipping on this rock-bound coast, and it has been used as a port of refuge for vessels navigating these seas from the earliest times. The Dunum Sinus of Ptolemy's Geography is supposed to have been at this opening of the coast, or perhaps at Dunsley Bay, which lies a little north of Whitby. The port of Whitby was originally named Streaneshalh, from the fact of its having a lighthouse showing the entrance of the port. This was at least 1500 years ago. The name of Whitby, though as old as the Danish invasion of Britain, is still merely the name given by the Danes to supersede the old Saxon appellation. The ancient history of Whitby is extremely interesting, for it was within the walls of the famous and ancient abbey of Whitby, that Cædmon produced the oldest existing poem in the English language. Whitby has commercial advantages, which are now becoming more fully developed. Though comparatively secure for vessels which enter the port, it has received great improvements, and the harbour is now secured by two piers (*viz.*, the east and the west piers), which cover the entrances, and break the force of the north-east winds, which blow with great fury along these coasts.

Leaving Whitby, and proceeding southward to Scarborough, the coast again rises into high cliffs, in some places from 250 to 300 feet high, and everywhere presents the appearance of a rock-bound shore, with scarcely any opening available for vessels. The rocks of the Lias formation continue as far as Robin Hood Bay, where they disappear, giving place to the rocks of the

Oolite formation, which extend along the coast to Scarborough and to Filey Bay. In these rocks are found the fossil plants and coal of the Oolitic system, Oolite iron ore, thin coal beds, Oolitic shale, and fossil ferns. Still further south are found the fossils of the Speeton clay, and those of the Gault and Kimmeridge clay.

At Robin Hood Bay is the eastern termination of a vein of greenstone, or basalt, which extends from the sea, and runs inward in a north-westerly direction, and from that point crosses the hills of Cleveland and the plain of York, into the coal measures of Durham in the neighbourhood of Bishop Auckland, a distance of forty or fifty miles. This vein is nowhere more than a few hundred yards in width; and it has the appearance of having forced its way up through a narrow crack, at a time when this part of the land was under the action of intense volcanic force.

South of Robin Hood Bay the cliffs continue to Skelbyness Point. The most prominent points along the coast are the Old Peak, to the south of Robin Hood Bay, Balwathie Point, a few miles further south, Petard Point, Hayburn Wyke, where numerous streams flow down into the sea, from hills covered with innumerable tumuli, belonging to the earliest ages of British history. Further south are Cloughton Wyke, Handel Point, Cromar Point, and Skelbyness Point. A few miles inland, opposite to Hayburn Wyke, are the springs of the river Derwent, which, though there close to the sea, send their waters into the interior, and ultimately discharge them into the Humber.

From Skelbyness Point the cliffs rise at Peasholm Point to a great elevation, and extend all along the coast to Scarborough. The rock on which Scarborough Castle stands is 250 feet high, and its surface covers an area of fifty-five acres, two roods, twenty-six perches. The projection of this great rock into the sea forms two bays, the one on the north, and the other on the south. That on the south has always afforded a certain amount of shelter against storms; but the protection was very imperfect, until the entrance to the bay was improved by the erection of extensive piers, which close in the harbour, and afford a fair shelter for vessels in the most stormy weather. But the sources of the wealth and prosperity of Scarborough are its smooth sands, its clear seas, and its magnificent scenery. These bring thousands of visitors to its health-giving shores every year, and have secured it nearly the highest rank amongst the watering places of England.

South of Scarborough the coast again runs in wide bays, with lofty rocks along the shore, and headlands running far into the deep. Among the chief of these are the White Nab, Osgodby Nab, Yous Nab, and the Nase, with Filey Bridge, or Brig, stretching far into the sea. These extend to Filey Bay, another pleasant watering place, with very level dry sands, and with cliffs rising from the shore. The Oolite formation continues to the southern side of Filey Bay, in the form of the Portland lime and sandstone.*

This bay has been recommended by a Royal Commission as eminently suitable for a harbour of refuge. For this object it is recommended by its depth of water; by the protection given to it by the natural breakwater of Filey Brig against being silted up from the sea; by the excellent anchorage ground; by the shelter from the south and west, afforded by Speeton Cliffs, rising to the height of from 300 to 400 feet; by its situation on the most prominent part of the coast, where it is passed by immense numbers of vessels sailing between the northern and southern ports; and by the fact that often hundreds of vessels are detained there, during the prevalence of south-west winds, from inability to get round the promontory of Flamborough Head, and exposed to be driven upon the rocks when the wind changes to the eastward. If protected by piers or sea-walls, Filey Bay would afford secure shelter in storms; and many good ships and valuable lives would be saved. The expense of constructing a harbour of refuge on this exposed and iron-bound coast, where for a great distance there is no harbour except tidal harbours, is the only objection made by successive governments to the making of so important a work; but this seems an insufficient reason for not providing a place of shelter for our vast coasting and foreign trade, and even for ships of the royal navy, on this part of the coasts of the German Ocean.

South of Filey Bay the land rises into lofty chalk cliffs stretching to Flamborough Head. The chalk formation extends only a few miles along the coast, commencing at the south side of Filey Bay, and terminating in the neighbourhood of Bridlington Quay; but it runs inland along the lofty Wolds of the East Riding, and ultimately through a great part of the eastern and southern counties. The lighthouse at Flamborough Head is 150 feet above the level of the sea, and has a revolving light. In ancient times Flamborough was a rude fortress inclosed by a line of entrenchments, extend-

* Ramsay's Geological Map of England and Wales.

ing from the northern to the southern cliffs, which prevented all approach to the place from land. In a bay, formed by a retirement of the land to the south of Flamborough Head, is the harbour of Bridlington Quay, a pleasant watering place, and also a tolerably secure port, owing to the natural shelter of the land, and the piers which have been formed to protect it from the prevailing winds.

It is the opinion of some distinguished antiquaries that Flamborough Head is the point named by Ptolemy as the *Ocelum Promontorium*; and some writers are of opinion that the Roman station of *Prætorium*, mentioned in the first "Iter" of Antonine's "Itinerary," was also in the neighbourhood of Flamborough Head and Bridlington.* Others have been disposed to fix the *Ocelum Promontorium* at Spurn Point; and the station of *Prætorium* at Patrington, not far from the present town of Hull. We shall state the grounds of these opinions in a subsequent chapter. Some early writers also mention Flamborough as the landing-place of Ida, the supposed founder of the Anglian kingdom of Northumbria, but others place the scene of that event at Bamborough in Northumberland. They are both places of great natural strength, and either of them, if covered by earth-works or stockades, might have been made a very formidable military position. In modern times, the commanding eminence of Flamborough is better applied to the purpose of giving light and security to vessels passing along these rock-bound coasts.†

From Bridlington Quay to the entrance of the Humber there is now no place in which vessels of any considerable size can take refuge; although there was at one time a harbour, at the ancient port of Ravenspurn, where Henry of Bolingbroke landed at the close of the fourteenth century. But Ravenspurn, with many villages along this coast, has long been swallowed up by the encroachments of the waves, which are undermining the alluvial cliffs along the whole of the eastern coasts of Holderness. The sands are very firm and extensive in many places, as at North Cliff, Hornsea, Mappleton, and Withernsea, and there is much sea-bathing along the coast; but there is no opening for large vessels at any point.

* *Iter Britanniarum*, or that part of the *Itinerary of Antoninus* which relates to Britain: by the Rev. Thomas Reynolds, *Iter I.* p. 146.

† Ordnance Maps of Yorkshire. No. 128, Six Inches to the Mile.

After passing Spurn Point the great estuary of the Humber opens, admitting the largest ships, and furnishing the means of commercial intercourse with all foreign countries. In the earliest account that we possess of this coast the Humber is mentioned by the geographer Ptolemy, under the name of the Abus, probably from the Celtic *aber*, a "confluence of waters," as one of the great natural features of this part of Britain. Patrington, near the entrance to the Humber, is believed by many writers to have been the Petuaria of Ptolemy; and it was the opinion of Camden and other eminent antiquarians that that was also the site of the Roman station of Prætorium, mentioned as the terminus seaward of the first "Iter," described in the "Itinerary" of Antoninus.* Whether this opinion is well founded or not, the modern commerce of the Humber has settled itself within a few miles of the ancient Patrington, at the port of Kingston-upon-Hull. Hedon, between Patrington and Hull, was also a considerable port in early times, and returned members to Parliament within living memory. But during the last 500 years the trade of the port of Hull has increased steadily, and never at so great a rate as during the present generation. It is now the third port in England, in the extent and value of its trade, and the outlet for nearly the whole of the commerce of Yorkshire. We shall trace the progress of the town, the port, and the commerce of Hull, in a succeeding chapter of this work.

Summary of the Natural Resources of Yorkshire, and of their present Development.—We have endeavoured in this, and in the three preceding chapters, to give a sketch of the natural resources of the county of York, as an introduction to the history of the industry of Yorkshire, which will form a considerable portion of our present undertaking. We have also endeavoured to show how far those resources, and the development that has been given to them, especially in our own age, have increased the wealth and population of the whole county. We have done this the more fully because it appears to us, that no clear view can be formed of the causes which have accelerated or retarded the progress of this or of any other district, without considering how far industry has been aided by nature; and because no sound opinion as to the future progress of society can be formed, without knowing whether its natural

* Camden's *Britannia*, p. 580, 1590.

resources are limited, and likely to be soon exhausted, or whether they are practically unlimited, and therefore capable of continued extension. England is almost everywhere a thickly-peopled country, sustaining on its soil a much larger population than any other country, in proportion to its extent. It has more than doubled its population during the present century, and very much more than doubled its wealth. But the rate of increase, both of population and of wealth, has varied very considerably in different parts of England during the last thirty years; having been very great in some, and comparatively small in others. Everywhere and in all ages, the chief cause of a rapid increase of population is to be found in the rapid development of the means of profitable employment for the labouring classes, who form the great mass of the people in all countries. Wherever this exists wages are high, the general condition of the people is prosperous, and their numbers increase rapidly. What are the means of profitable employment is comparatively unimportant. They may be derived from the feeding of sheep and the gathering of gold, as in Australia; from the cultivation of the soil, and from a great trade in its products, as in the United States of America; or from the combined advantages of a skilful agriculture, rich mines, ingenious manufactures, and a commerce extending to the whole world, as in England. Any one of these causes is sufficient to give a great impulse to the population of the country in which it exists. It has been one principal object of the present and of the preceding chapters of this work to show how far the great elements of agricultural, of mining, of manufacturing, and of commercial prosperity exist in the county of York at the present time; and that chiefly to enable our readers to judge of the real nature of the great prosperity which has been so long enjoyed by the inhabitants of this extensive county, and of the grounds for believing that it will continue to exist in future years.

With regard to the agricultural resources of the county of York, it has been shown in previous chapters, from information supplied by high local authorities, as well as from the Parliamentary Returns of the systems of cultivation, and the quantities of cattle, sheep, and horses produced in the three Ridings, and in the whole county, that agriculture is in general skilfully-conducted, and yields a liberal return. The amount of employment supplied by agriculture depends partly on the quantity and quality of

the land cultivated, and partly on the system of cultivation adopted. Within the last two generations a large extent of land has been brought into first-rate cultivation, which at the commencement of this century yielded very little either of food or of employment for labour. This has been especially the case with the light lands of the county, including the whole of the chalk formation, which extends over nearly half a million of acres, and has during the present century been converted from wild unproductive downs, into fertile corn-fields. The heavy lands of the county have also been greatly improved during the last thirty years, owing to the extensive introduction of thorough draining. On the limestone lands in the beautiful dales of the West and North Ridings, the improvement during the present generation is said to have been as great as in any part of Yorkshire. Even on the higher hills, some of which approach to mountains, there has been a considerable improvement. Every year adds something to the amount of cultivated land in this county, and as land is almost the only kind of property of which there is a limited supply in England, we shall no doubt witness a continuance of that very great and general improvement in agriculture that has been witnessed from the commencement of the present century, and more especially during the last thirty years.*

The improvement and increase in the mineral wealth of the county of York, during the last forty years, has been great beyond all previous example. Coal and iron are the two chief sources of mineral wealth in this kingdom, and the production of

* Just as we are concluding this chapter of our work we find in the public papers of August, 1870, the following account of the Yorkshire Agricultural Shows for this year:—

THE YORKSHIRE AGRICULTURAL SHOWS OF 1870.

Last week was a perfect agricultural festival in Yorkshire. A year or two ago it was thought during the incidence of the cattle plague that the local shows were losing interest, and, indeed, efforts were made to merge them into North Riding and East Riding shows, to migrate as does the County show and the Royal. This met with great opposition, but had the effect of stirring the various societies into increased activity, and very successful exhibitions have already been held at Selby, Thirsk (a new society), Appleton, Bridlington, and Driffield. The last-named show was held on Friday, and was, as it is usually regarded to be, the rehearsal of the Great Yorkshire itself. Lord Hotham was the president. The money prizes reached £350, and there were several silver cups given as prizes, among which one was given by the president, one by Mr. C. Sykes, M.P., and another by Count Batthyany. There were 856 entries, of which 250 were for horses. Indeed, this is now regarded as the best horse show of the North, and excels frequently the Yorkshire itself. Among the classes for short-horn bulls Mr. Hutton of Sheriff Hutton, York, and Mr. Frank of Fylingdales, Whitby, were the most successful. The All England Cup for the best yearling bull shown was won by Mr. Jordan of Elmswell. In the sheep classes the most successful exhibitor was Mr. E. Riley of Kiplingcoates, Beverley, who also won the East Riding silver tankard for the best pen of gimmers. In the hunting classes Mr. Shaw of Shipton, Market Weighton; Mr. Lamplough, of Nafferton; Mr. Jarret, of Harpham; Mr. W. H. Broadley, M.P.; and Sir George Cholmley, were most successful. The President's Cup of £25, for the best roadster, was won by Mr. J. Robson of Old Malton. Mr. C. Sykes' Cup, for the four-year-old hunter, was won by Mr. Barkworth of

both those invaluable articles has increased in this county with remarkable rapidity. We have shown in our account of the Yorkshire coal-field, how greatly its productiveness has increased from the time when a regular account was first taken, a few years ago, of the yearly produce of British mines. The increase in the produce of iron in Yorkshire is still greater in proportion even than the increase of coal, and is the more remarkable from the circumstance, that much the larger portion of the increase is derived from strata which were not known to contain any iron worth working, forty years ago. It is thus an entirely new discovery of mineral wealth, and seems likely from recent indications both in the North and the East Riding, and in other districts in England where the Lias and Oolite exist, to be followed by fresh discoveries. Already, however, Yorkshire produces a much larger quantity of iron than any other English county, besides yielding a considerable quantity of lead and many other valuable minerals, including limestone, of various kinds, and building stone of the finest and most durable qualities.

Wherever iron, coal, and water-power are found in abundance, machinery and manufactures also abound. It is so, both in the case of the textile manufactures of Leeds, Bradford, Halifax, Huddersfield, and Dewsbury, and also in that of the iron work and cutlery of Sheffield and Rotherham. The West Riding is covered with mills and workshops, from the banks of the Don to the banks of the Aire; and from the great variety and value of, and the universal demand for, the products yielded by them, the manufacturing industry of Yorkshire rests on a very broad and solid foundation.

The commerce of Yorkshire has also the advantage of one very commodious port at Hull, and of several others that are partially so. Being situated in the narrowest part of England, it has facilities for obtaining all that it requires both from the east and the west, and of exporting the surplus products of its industry to foreign countries.

Having described the natural resources of the county of York, we now proceed to trace the history of its people, from the earliest ages to the present time.

Raywell; the Society's Cup of £25, for the best hunter, (all ages), by Mr. H. Jewison, Raisthorpe; a Society's Cup, for three-year-old hunters, by Sir George Cholmley, Newton; and a Cup of ten guineas, given by Count Batthyany, for the best drive mare or gelding, by Captain Boynton of Hanthorpe. This was quite a new and successful feature. There were excellent shows of pigs and poultry. The luncheon was attended by 500 ladies and gentlemen. Lord Hotham presided, and among the speakers were Mr. C. Sykes and Mr. Broadley.

CHAPTER V.

THE EARLY HISTORY OF THE COUNTY OF YORK.

THE BRITISH AND ROMAN PERIODS, FROM THE EARLIEST AGES TO
THE RETIREMENT OF THE ROMANS, ABOUT A.D. 421.

WHEN the Roman armies, under the command of Julius Agricola, succeeded in forcing their way into the northern parts of Britain, in the reigns of the Emperors Vespasian, Titus, and Domitian (A.D. 78-84), about forty years after the Roman Emperor Claudius had commenced the attempt to conquer the whole of Britain, (A.D. 43); they found that the portion of the island which lies between the German Ocean on the east, the Irish Sea on the west, the rivers Humber and Mersey on the south, and the mountainous regions on the borders of Caledonia on the north, and which includes the present counties of York, Lancaster, Durham, Northumberland, Cumberland, and Westmoreland, was inhabited by a numerous and warlike people, named the Brigantes.* This powerful British tribe long offered a determined resistance to the Roman armies, and, though often defeated on the field of battle, continued to rise in frequent insurrections against the Romans, for more than a hundred years after the Brigantine territory was claimed as a province of the Roman empire.† This they were better able to do, because their country was in general hilly, and in many parts mountainous; was covered with thick forests; and was rendered difficult of access by the overflowing of the rivers and the irruption of the seas, which converted the southern portion of its plains into inaccessible morasses. On the east and west they were protected by the sea, which was not fully explored, and still less commanded, by the Roman fleets, until the time of Agricola.‡ Previous to the conquests of Agricola in the northern parts of Britain, the territory of the Brigantes was the scene of important intrigues and operations affecting the fortunes of the Romans in Britain, as well as those of the British tribes.

* *Julii Agricolæ Vita* C. Cornelli Taciti, c. 17. Ptolemæi *Geographia*, lib. i. p. 107.

† *Pausaniæ Græciæ Descriptio*, lib. viii. cap. xliii.

‡ C. Cornelli Taciti *Agricola*, cap. xxv.

In the great struggles with the people of the southern, western, and eastern parts of the island, under Caractacus and Boadicea, the Brigantes were sometimes on the side of their fellow countrymen, and at others on that of the Romans; for in those times Britain was divided amongst numerous tribes, which lived in a state of frequent hostility to each other, and were generally more anxious to destroy the power of their native rivals, than to guard their own independence against foreign enemies. As the great Roman historian, who has given us incomparably the best account of the ancient Britons, observes:—"Our greatest advantage in contending with tribes so powerful is, that they do not act in concert. Seldom is it that two or three states meet together to ward off a common danger. Thus, while they fight singly, all are conquered."* This was the case in the struggle of the Romans against Caractacus and the western Britons, in which one faction of the Brigantes, commanded by their queen, Cartimandua, who seems to have reigned in her own right, formed an alliance with the Romans; whilst a more numerous body under the command of her husband, Venusius, from whom she was separated, was ranged on the side of Caractacus and the independence of Britain.† Thus a violent family quarrel between the king and the queen of the Brigantes, and a civil war amongst their respective adherents, divided the Brigantes into two hostile factions, and powerfully contributed to destroy the independence of the whole nation.

A few years after the overthrow of Caractacus and of Boadicea, the command of the Roman armies was conferred by the Emperor Vespasian on Julius Agricola, a consummate general, an able administrator, and an enlightened statesman. In the first and second years of his command in Britain he overran and conquered the greater part of the country between the Humber and the Tyne, forming the most fertile and accessible portion of the territory of the Brigantes; and this became the most northern portion of the permanent conquests of the Romans in Britain. In subsequent years Agricola overran the country, extending northward from the Tyne and the Solway, first to the Forth and the Clyde; subsequently to the banks of the Tay; and ultimately to the foot of the Grampian mountains.‡ In his latter campaigns

* C. Cornelii Taciti Agricola, cap. xii.

† C. Cornelii Taciti Annalium lib. xii.

‡ C. Cornelii Taciti Agricola, cap. xxix.

he had the advantage of being supported by a powerful and well-appointed Roman fleet. This he caused to be constructed or collected in the seas of Gaul and Britain; and it gave him great advantages in contending with tribes which had no armed vessels of their own, but whose territory was washed on both sides by the sea, was penetrated at numerous points by large estuaries, and was intersected by many rivers, deep enough to be accessible even to the war ships of the Romans, which drew little water, and were impelled by rowers. With the advantages afforded by his fleet, which served to bring up arms and provisions, and, in case of need, to convey reinforcements, and which insured shelter and a safe retreat even in case of defeat, Agricola was able to maintain his army far in advance of the usual resources of an invading army, and for a while struck terror amongst the native Britons, who had never seen either a fleet or a regular army before.* With these appliances he made many brilliant conquests, including his celebrated victory at the foot of the Grampians, which, with his other exploits, have been immortalized by his son-in-law, the historian Tacitus. In addition to this, his fleet sailed round Britain, which had previously never been certainly known to be an island; explored the shores of Hibernia (or Ireland); discovered the Orkney, and perhaps the Shetland islands; and collected information as to an island or islands lying still further to the north, and known by the vague name of Thule, which may probably have been the more distant Faroe Islands.† Agricola also probably selected the principal naval stations of the Romans in the northern parts of Britain, of which Eboracum, or York, was long one of the ports commanding the German Ocean, and Deva, or Chester, one commanding the Irish seas.‡ Yet though Agricola's successes were very great, he achieved nothing that was permanent in the country lying north of the river Tyne, for he found it prudent to retire immediately after his last great victory over Galgacus; and although the Romans for a while held and fortified the narrow line between the Forth and the Clyde, they were ultimately compelled to fall back, to the more defensible line extending from the mouth of the Tyne to the mouth of the Solway.§ This line, generally known as the Vallum or Roman wall, fortified by successive emperors and commanders, became the northern boundary of the Roman empire

* C. Cornelii Taciti Agricola, cap. xxv. † Ibid. x. ‡ Ptolemæi Geographia, cap. ii.

§ Iter Britannicum Antonini; iter i.

in Britain; and the city of Eboracum or York, erected on a fertile plain, on the banks of a navigable river, and with military roads reaching to the eastern and western extremities of the Roman wall, became the military capital of the Romans in this island. Here they founded a colony of Roman citizens, and established the head-quarters of the sixth Roman legion.* That legion, perhaps aided by the ninth legion, occupied the city of York for upwards of three hundred years (which was nearly as long a time as the Romans remained in Britain), besides furnishing garrisons for most of the forts along the Vallum or Roman wall, and for many detached fortresses in the hilly and mountainous districts between the Humber and the river Tyne.

At the time when the Romans conquered Britain, the inhabitants of the British Islands had made some progress in the useful arts. In this respect they seem to have been nearly on an equality with the Gauls, and considerably in advance of our ancestors, the ancient Germans. The existence of numerous towns, mentioned by Ptolemy, is itself a proof of a considerable amount of intelligence, and of the existence of laws or customs which gave some protection not only to person, but to property. The most favourable account that we possess of the ancient Britons is that which we owe to the historian Tacitus, who had the best means of knowing what they really were, and who added to a superior knowledge of facts a great power of judging of them with sagacity. The account which Tacitus gives of the ancient Britons, at the time when the greater part of them were conquered by his father-in-law, Julius Agricola, may be regarded as founded on the information collected by that distinguished general and statesman, during his long services and his extensive command in Britain. Agricola first went to Britain when he was only twenty years of age, and served in that country for three years, from A.D. 59 to 62, under the command of a very active and enterprising officer, Suetonius Paulinus—"a pains-taking and judicious officer," under whom he saw much hard service. "Never, indeed, had Britain been more excited or in a more critical position; veteran soldiers had been massacred, colonies burnt, armies cut off: the struggle was then for safety; it was soon to be for victory. And though all this was conducted under the leadership and direction of another, though the final issue and the glory of having won back the province belonged to the general, yet

* Ptolemæi Geographia, lib. ii.

skill, experience, and ambition were acquired by the young officer."* It will be seen from these lines that Agricola had served a severe apprenticeship of three years' duration in Britain, at the period of his opening manhood. Ten years later (A.D. 72), when he had attained the age of thirty-three years, we find that he was again serving in Britain, first under Vettius Bolanus, and afterwards of Petilius Cerialis. His services in Britain, especially under the two latter commanders, had been so great, that "a general belief prevailed that the province of Britain was to be his, not because he had himself hinted it, but because he seemed worthy of it."† Five years later, in A.D. 78, when Agricola had reached the age of thirty-nine years, he was appointed to the government and command of Britain, which office he held for eight years; having fought his last great battle with the brave Caledonian chief, Galgacus, within sight of the Grampian mountains, A.D. 84.‡ His knowledge of Britain and its inhabitants must thus have been much greater than that of any other Roman of anything like the same intelligence and capacity, and we may receive with much more confidence the information derived from him than that obtained from any other authority. This information has come down to us through the historian Tacitus, who has written the account of his exploits, and who says, "He was consul, and I but a youth, when he betrothed to me his daughter, a maiden even then of noble promise. After his consulate he gave her to me in marriage, and was then at once appointed to the government of Britain, with the addition of the sacred office of the pontificate."§ The only other Roman writer of equal judgment and talent, whose account of Britain rests on what may be regarded as personal knowledge, is Julius Cæsar. But he spent less than three months in the island, saw only the southern part, and wrote more than a hundred years earlier than Tacitus, at a time when little or nothing was known about the northern or even the central parts of Britain.

Agricola speaks of the Britain of his time as of a country producing all the plants of Europe except the olive and the vine, and as yielding the principal metals, including gold and silver. In a few lines he describes its principal products:—

"With the exception of the olive and vine, and plants which usually grow in warmer climates, the soil will yield, and even abundantly, all ordinary produce. It ripens, indeed, slowly, but

* C. Cornelli Taciti Agricola, cap. v. † Ibid. cap. viii. ‡ Ibid. cap. xxiv. § Ibid. cap. ix.

is of rapid growth, the cause in each case being the same ; namely, the excessive moisture of the soil and of the atmosphere. Britain contains gold and silver, and other metals, the prize of conquest. The ocean, too, produces pearls, but of a dusky and bluish hue."

With regard to the Britons themselves, Tacitus, no doubt from the report of his father-in-law Agricola, always speaks of them with respect, and sometimes even with sympathy, though it was his settled opinion, like that of all Roman writers, that all nations were born to obey the Roman yoke. One of the first things that Agricola did after his first campaign, as commander-in-chief and governor of Britain, was to attempt to introduce amongst them some of the elements of Roman civilization ; and we learn from the report of Tacitus, that he found the Britons to be intelligent and quick to learn. Speaking of the events of the winter of A.D. 79, which followed his first campaign, and was probably spent in the district which is now included in Yorkshire and the other northern counties, Tacitus says:—"The following winter passed without disturbance, and was employed in salutary measures. For to accustom to rest and repose, through the charms of luxury, a population scattered and barbarous, and therefore inclined to war, Agricola gave private encouragement and public aid to the building of temples, courts of justice, and dwelling houses, praising the energetic and reproving the indolent. Thus an honourable rivalry took the place of compulsion. He likewise provided a liberal education for the sons of the chiefs, and showed such a preference for the natural powers of the Britons over the industry of the Gauls, that they who lately disdained the tongue of Rome now coveted its eloquence. Hence, too, a liking sprang up for our style of dress, and the toga became frequent and fashionable. Step by step they were led to things which disposed to vice, the lounge, the bath, the elegant banquet; all this in their ignorance they call civilization, when it was but a part of their servitude." This last observation of Tacitus is merely one of the commonplaces of the philosophers of the Stoic school, which still held its ground at Rome, notwithstanding the unrivalled wit and admirable good sense with which its exaggerations had been lashed by Horace more than fifty years before.* The adoption of the bath and of

* The extravagances of Damasippus, and of other Stoic philosophers, are ridiculed by Horace with unrivalled wit and humour, in his Satires, lib. i., Sat. iii. lib. ii., Sat. iii., while ample justice is done to the nobler parts of their philosophy in the last of Horace's Epistles, and in other parts of his works.

the Roman style of dress were certainly great improvements, and within moderate limits the use of the promenade or portico, and even of the elegant banquet, were rather proofs of the good taste than of the love of luxury of the ancient Britons. What Tacitus says of their readiness to build temples, courts of justice, and improved dwelling-houses, to adopt a liberal education for their children, and of the great success with which they cultivated the language and literature of Rome, is calculated to excite respect for their natural abilities, and even to produce considerable doubt of the stories of utter barbarism which is imputed to them by earlier Roman writers, few of whom knew anything of them except from the report of witnesses very much inferior both in candour and experience to Agricola and Tacitus.

Who were the earliest inhabitants of this part of Britain?—The question of who were the earliest inhabitants of this part of Britain, has recently acquired greatly increased interest from the discovery, especially in the county of York, within the last twenty years, of the bodies and instruments of war and other remains of many hundreds of the ancient Britons, in the tumuli which are spread in great numbers over the wolds and moors of Yorkshire, but which are rapidly disappearing under the plough, with the reclaiming of the waste lands of the county. Thousands of these tumuli, containing the remains of what were probably the earliest race of Britons, have no doubt disappeared in the course of ages, without any record having been preserved of their contents. But most happily, for the progress of historical knowledge, some hundreds of these tumuli have been explored during the last thirty years, chiefly on the hills and mountains of Yorkshire and Derbyshire, and on the extensive and thinly peopled downs of Wiltshire, by able and learned men, capable of appreciating, and of recording for the use of the present and of posterity, all that is remarkable in the evidence which these tumuli and their contents afford, of the habits, the superstitions, the modes of life, and perhaps, in some cases, of the families of nations, to which the early races interred within them belonged. The general result of these inquiries is, that the British tribes whose remains have been thus examined, in general belonged to a race very much inferior, in knowledge of the useful arts, to the Celtic inhabitants who were found in Britain by Cæsar and Agricola. The latter certainly

possessed a knowledge of the mode of working copper, iron, and the other metals; were able to build formidable war chariots, armed with scythes, capable of mowing down the Roman soldiers in battle; they were armed with long swords, only differing from those of the Romans in being longer, and not being pointed at the end; they were able to train horses; they must have had tolerable roads for their chariots, and they had built a large number of towns previous to the time of the first geographical descriptions of Britain given by Strabo, in the time of Augustus, and by Ptolemy of Alexandria, in the time of Hadrian.

The Remains of the Ancient Britons Discovered in the Tumuli of Yorkshire.—Until the present age, the earliest information that was possessed respecting the inhabitants of those parts of Britain that lie to the north of the river Humber, and of which the present county of York forms the most extensive portion, was derived exclusively from Roman and Greek histories, or works of geography. The accounts which even those works give of Britain, before the time of the Roman invasion, are very imperfect. There is, however, reason to believe that the Tyrian or Carthaginian colonists settled at Cadiz, or Gadir, in Spain, made voyages to Britain some hundred years previous to the Roman conquest, for the purpose of purchasing copper and tin, and lead. It is even possible that the Tyrians and Sidonians made similar voyages to Britain for the same object in still earlier times. But we have no contemporary, or very early, accounts of any such voyages. Herodotus, the father and founder of history, who visited the city of Tyre about 440 B.C., when he was collecting, by personal inquiry, the materials for his delightful and invaluable account of the ancient world, does not appear to have heard of the name of Britain or Albion. But he had heard the name of the Cassiterides, or tin-producing islands, though he seems to have known nothing but their name, and the most important of their products; for he says, "Nor am I acquainted with the Cassiterides Islands, from whence our tin comes." But this merely shows his great caution, and is not intended to throw any doubt either on the existence of islands so-called, or on the trade in tin which was carried on with them. On the same ground, of want of personal information, he declines to speak of the river Eridanus or Po, and of the trade in amber carried on down that river; and hesitates to speak of the sea on the western side of Europe, on the ground

that though he had diligently inquired, he had never been able to learn from any man, who had himself seen it, that there was a sea on the western side of Europe.* From the language of Herodotus and some other writers, it has even been thought that the first knowledge of Britain was obtained from the Greek colonists of Massilia, or Marseilles, on the south coast of Gaul, founded about 600 B.C., who sailed up the river Rhone, from the Mediterranean, and, after an overland journey, descended the valley of the Loire, or perhaps that of the Seine, to the southern shores of the British Channel. This seems to have been the course taken by Pytheas, a traveller of Marseilles, who is the first person of whom it can be said, with anything like confidence, that he really visited Britain.† From his time there is no doubt that the trade in tin and lead, for which Britain was already famous, was carried on across the British Channel, and then by means of the rivers of Gaul, to Marseilles and the Mediterranean. Other writers, however, have been of a different opinion, and have maintained that the early accounts of the voyages of Tyrian colonists from Cadiz to Britain are substantially true; and that the tin or kesseteron mentioned by Homer in the Iliad about 850 years B.C., as being in use amongst the Greeks, was brought, even in that early age, by the Phœnicians from the islands of Britain. If the Britons supplied the Tyrians with tin and copper as early as the times of Homer, they must have had a knowledge of the art of smelting and working those metals nearly a thousand years previous to the conquest of Britain by the Romans.

We are probably carried back by recent discoveries, in the tumuli of Yorkshire, to ages which preceded the time when the use even of tin and copper, and of the bronze made by mixing those metals in well ascertained proportions, was known to the inhabitants of Britain, and when their implements of war and industry were made of flint, horn, and wood. Ignorance of the use of these metals, or at least of one of them, always marks a period of extreme barbarism, and a condition of society much lower than that which existed in Britain at the time when the greater part of the island was conquered by the Romans.

For some time, and throughout many countries of Northern Europe, antiquaries have been accustomed to distinguish the objects found by them in ancient tombs, as belonging to one

* Herodotus, book iii. Thalia, cap. 15.

† Strabonis Geographia, lib. iv.

of three periods, namely, the Stone, the Bronze, and the Iron. In the first of these periods it appears as if stone, wood, and bone, were the only materials which the people of that age had been able to convert either into arms or into implements of industry. According to an eminent writer on this subject, the people of the Stone age occupied a very low rank in civilization. "The use of metal was unknown to them, and hence all their implements were made of stone, of bone, or of wood. With such tools the inhabitants could make no great progress in agriculture; on the contrary, hunting and fishing formed their chief sources of subsistence. For catching fish in rivers and in the sea, they used hooks, harpoons, and lances of flint; and they possessed boats formed of stems of trees, which had been hollowed out for the purpose. When hunting, they were armed not only with bows and arrows, but also with lances and hunting knives, the more easily to slay the large animals, whose skins served them for garments. Their dwellings were formed most probably of stone, wood and earth; for they even buried their dead with much care in cromlechs, which were formed of large stones, smooth on the inner side. By the side of the dead were laid their hunting and fishing implements of bone and stone. Similar cromlechs, with similar contents, are to be seen on the south coast of the Baltic, and on the north-west and west coasts of Europe, in England, and Ireland.*

The period at which the Stone age ends and the use of metal in the forming of instruments of war and industry commences, varies very greatly in different countries. There are countries in Australia and Africa in which the use of the metals, and at all events the mode of fabricating them, is not understood even to the present day; but in the countries of the east, which first became civilized, including Phœnicia and Greece, the use of the metals commenced at least a thousand years before the Christian era; and as one of the most valuable of those metals, tin, was chiefly obtained from Britain, it is very probable that they were in use in this country at almost as early an age. In the earliest history which the world possesses, namely, that contained in the Pentateuch, it appears that bronze or brass had taken the place of stone amongst the inhabitants of Syria at a very early age; although knives of stone were still used for some

* The Primeval Antiquities of Denmark, by J. J. A. Worsaae, translated and applied to the Illustration of Similar Remains, by William J. Thomas, London, 1849.

purposes connected with religion, and iron was coming into use for purposes of war. In the account of the manners and arts of the Greeks and Trojans contained in the *Iliad* and the *Odyssey*, which were written about 850 years before the birth of Christ, bronze, or as it is generally called, brass, are almost the only metals mentioned as being used for warlike or other purposes. Even swords and spears, as well as shields and bucklers, were made of bronze; and although Homer mentions one warrior who was armed with an iron weapon, that weapon was formed of a mass of iron in the shape of an iron club.*

Although bronze is a very inferior metal to iron or steel, both for the purposes of war and industry, yet the introduction of its use is a great step in civilization. According to the writer whom we have already quoted on the subject of the Stone age, "in the next period, or during the age of bronze, a greater degree of cultivation was introduced into the country, and by this means all previous relations were completely changed: bronze tools gradually supplanted the implements of stone, which, however, continued for a long time to be used by the poorer classes; hunting and fishing gave way to agriculture, which was then commencing. The forests in the interior of the country were cleared by degrees, in proportion as agriculture was more widely extended, and the population increased. Intercourse with other countries was opened, partly by means of warlike expeditions, partly by commerce; navigation acquired importance, and ships were built of a larger and better description, than the simple vessels formed of hollow trees. At this period it was customary to burn the bodies of the dead, and to deposit the bones which remained in cinerary urns, in small stone cists, or under heaps of stones in large mounds of earth. Sometimes the bodies were also interred unburnt in stone cists, which are, however, always totally different, both in size and form, from the cromlechs of the Stone period. Barrows containing implements of bronze, are found in great numbers over nearly the whole of Europe, except in Norway and Sweden, where they are extremely rare."†

In all countries of which we have any clear account, copper, generally mixed with tin, came into use before iron; and this appears to have been the case in Britain also, for copper is found in the British tumuli of an age much earlier than that in which iron is found.

* *Homeri Ilias*, lib. vii.

† Worsaae, *Primeval Antiquities*.

This was just what was to be expected, from the much greater ease of smelting and working copper as compared with iron. As Worsaae observes, we know that copper is found in the mines in a state of such comparative purity as to require very little smelting for the purpose of being brought into a state fit for use, while, on the other hand, iron in its rough state looks more like a stone than a metal; and, moreover, before it can be worked, must be subjected to a difficult process of smelting by means of a very powerful fire. If we look at the question only on this side, we are forced to conclude that copper must have been found and employed before iron; and this is confirmed, not only by early historical notices, but also by recent investigations of ancient remains. In Asia, from whence the greater portion, probably all, the European races have migrated, numerous implements and weapons of copper have been discovered in a particular class of graves; nay, in some of the old and long-abandoned mines in that country, workmen's tools have been discovered made of copper, and of very remote antiquity. We see, moreover, how at a later period attempts were made to harden copper, and make it better suited for cutting implements by a slight intermixture, principally of tin. Hence arose that mixed metal to which the name of "bronze" has been given, and which, according to the oldest writers of Greece and Rome, was generally used in the southern countries before iron.

It appears from the contents of the British tumuli, that little if any iron was deposited in tombs in this country until a somewhat later period, when the Celts, the ancestors of the oldest British race of whom we have any historical account, had probably become firmly settled in Britain. Tacitus informs us that the Celtic Britons fought with long swords, which were no doubt made of iron, as he compares them to the swords of the Roman soldiers, and only speaks of them as differing from the latter in being longer, and not pointed at the end. It appears, however, from the "Germania" of Tacitus, that there were some districts in the east or to the north of Germany, in the country inhabited by the Finns, in which the use of iron was very little known, even in the times of Germanicus, who commanded the Roman armies in Germany in the reigns of Augustus and Tiberius. It is also stated by the antiquaries of Denmark, that the use of iron was not completely established in Scandinavia until the eighth century of the Christian era, which is many hundred years after the use of that metal was well known in Britain. It has been supposed that

the original inhabitants of Britain, if not of the greater part of western Europe, who were conquered, and to a great extent destroyed by the Celts, belonged to the Finnish race, and resembled the Laplanders, and other tribes of feeble organization, which are now found scattered along the coasts of the icy sea.* Tacitus in describing the Fenni, in the last chapter of his "Germania" says:—"The Fenni are strangely uncouth and squalidly poor; they are without arms or homes; their food is herbs, their clothing skins, their bed the earth. They trust wholly to their arrows, which for want of iron are pointed with bone. The men and women are alike supplied by the chase; for the latter are always present, and demand a share of the prey. Their very children have no shelter from wild beasts and storms, but a covering of interlaced boughs. Such are the homes of the young, such the resting place of the old. Yet they deem it greater happiness than groaning over field labour, toiling at building, and poising the fortunes of themselves and others between hope and fear. Careless of mankind, careless of the gods, they have realized the very hard condition of having not even a wish." This appears to be a description of a race greatly resembling those whose remains have been discovered in the more ancient tumuli of Yorkshire and other English counties, but not at all resembling the well armed, active, and comparatively intelligent race of men, which existed in this part of Britain in the time of Tacitus and Agricola, and of whom remains have also been found in some of the tumuli of Yorkshire. If such a race as the Fenni ever existed in Britain, it had probably been entirely destroyed long before the coming of the Romans, by the more warlike Celts who seem to have possessed the whole of Britain at the time of the Roman invasion.

During the last few years about one hundred of the tumuli or ancient burial-places of the Britons, still existing on the wolds and moors of Yorkshire, Durham, and Northumberland, but which are rapidly disappearing, as cultivation extends over what have long been uncultivated wastes, have been examined by the Rev. Canon Greenwell, of Durham, and other experienced antiquarians, and have yielded many very curious and interesting results.

Up to the close of the year 1868, the number of tumuli examined in Yorkshire was between eighty and ninety,† and in the following

* Prichard's Physical History of Mankind, vol. 3, p. xx.

† See Table containing Summary and Results of the Rev. Canon Greenwell's Researches in "Pre-historic Times, as Illustrated by Ancient Remains, &c.": by Sir John Lubbock, Bart., M.P., F.R.S., 1869.

year, 1869, many more, and some of them of very great interest, were also examined. The eighty-seven tumuli examined in the county of York were chiefly found on the moors of the North Riding and on the wolds of the East Riding. In the North Riding the whole number of tumuli examined was twenty-four. Of these, the number on the Egton Moors was two, on Hambleton one, on Gunston Moor three, at Castle Howard ten, and on Wyecomb Moor eight. In the East Riding the tumuli examined were sixty in number. Their positions were—at Kirby one, at Underdale one, at Langton Wold one, Duggleby one, Heslerton Wold one, Sherburn Wold six, Potter Brompton seven, Ganton Wold eight, Wellerby Wold six, Rudstone one, Butterwick one, Weaverthorpe eighteen, Enthorpe six, and Gardham four. The only tumulus examined in the West Riding, was at Ferry-bridge; several, however, had been previously examined in Craven and the hilly parts of the West Riding, as well as in the neighbouring counties of Cumberland, Westmoreland, and Northumberland. The whole number of tumuli described as having been examined in the northern counties, by the Rev. Canon Greenwell, up to the close of 1868, was 103. But the subsequent researches were remarkably curious and interesting, as will be seen from the account of those of the year 1869, given in a subsequent part of this chapter.

If we may judge from the presence or absence of objects of bronze, iron, or other metals, in the tumuli thus examined, of the age in which the persons whose remains were found in them lived and died, we should say that they belonged to the earliest times and families of the British race. In only one of them was there a fragment of iron found, and that was in the form of the tongue of a fibula, or brooch, found at Weaverthorpe. This morsel of iron had been used for the purpose of replacing a broken bronze tongue. The number of bronze articles was somewhat more numerous, and amounted to eleven. These consisted of a dagger found at Wykeham Moor; three awls, at Langton Wold; a flat piece of bronze, at Potter Brompton; a dagger, axe, drill, and awl, at Butterwick; two armlets, a fibula, and two earrings, at Weaverthorpe. The number of articles formed of bone and flint far surpassed that of the articles made of iron and bronze. At Langton Wold there were two implements of bone, one like the bow of a drill; at Potter Brompton, two pins of bone; another at Ganton Wold; at Rudstone,

a club made from the antler of a red deer ; two tines of red deer antler cut off ; a hammer of red deer horn, and at Ferrybridge a bone pin. The number of articles of stone was still greater, amounting to thirty. At Castle Howard was found a round scraper of flint unburnt ; at Wykeham Moor, three pieces of flint burnt, a large flint knife, and a javelin head ; at Sherburn Wold a javelin head burnt, a scraper, and five chippings ; at Potter Brompton Wold, a perforated axe burnt and arrow point of flint barbed, and a long flint knife ; at Ganton Wold two oval scrapers, one burnt ; at Willesby Wold, two knives and four flint chips ; at Butterwick a knife ; at Weaverthorpe, a knife and two large plates, an oval scraper or knife, a perforated axe, a round scraper of flint, a flake, two flint chippings, and a javelin head. In Cumberland, Westmoreland, and Northumberland, were found a long narrow knife, a pointed oval knife, an arrow point, and another knife.*

In much the greater part of these tumuli the bones of the deceased, or considerable portions of them, were found, and were in such a state of preservation as to enable the experienced antiquaries who examined the graves or cists, to ascertain whether they were those of men, women, or children. The other objects of what may be called a miscellaneous nature, found in one or other of the tombs, were two cinerary urns, one covered by a third urn, and the whole surrounded by a circle of stones set on edge and four feet in diameter ; two shoulder-blades of a boar in one grave ; the remains of a man on the natural surface, and close to him those of a woman, who had a piece of jet, a piece of deer's tooth pierced, a vertebra of a fish, and three cowries at her waist ; the remains of a man and a woman overlying a deposit of burnt bones, probably a man, his wife, and slave ; an urn laid on its side upon the bones ; a grave containing the scattered remains of three bodies, and several fragments of a drinking cup ; five large jet and one stone buttons ; a necklace of jet beads ; on the end and under, forty-nine flat circular discs and a triangular central pendant ; necklace of blue glass beads with a zigzag pattern in white ; at Weaverthorpe an armlet very like the armlets of the late Celtic age, and the necklace, similar to those found at Arras in France. Also at Weaverthorpe, several pieces of a drinking cup and an urn ; at Enthorpe three urns. Food vessels and articles of pottery were

* Pre-Historic Times as Illustrated by Ancient remains, &c.. by Sir John Lubbock, Bart. F.R.S., 1869.

found in a very considerable portion of the graves—altogether, in forty of the Yorkshire graves, eighty-seven in number; and in forty-seven out of 103 tumuli examined by the Rev. Canon Greenwell.*

The researches amongst the Yorkshire tumuli made in the year 1869 were very successful. The general result was to show that the persons there interred belonged to a very early age, and to British tribes which still employed flint and bone as their principal materials, though they were not altogether destitute of bronze, and possessed the art of manufacturing earthenware from clay with considerable skill. In the month of November of that year, the Rev. Canon Greenwell and several other gentlemen completed the examination of two very large round tumuli on the estates of Sir Henry Boynton, Bart., at Rudstone, near Bridlington, which yielded interesting results. Rudstone is the place where the only known megalithic monument in the East Riding exists, the Celtic *mænhir*, "long stone," in the churchyard. The barrows were in the immediate neighbourhood, and formed a portion of a group originally consisting of seven. Those opened in 1869 were full of secondary burials, both burnt and unburnt; and in both cases the primary interments in the mounds had been destroyed by the insertion of remarkable burials in deep graves, dug into the chalk rock. In the centre of both barrows cylindrical-shaped graves had been dug, destroying whatever else had been previously interred. In one tumulus an opening of very large size, probably eleven feet in the rock, had been made, and in it a double cist was found of large stones of oolitic sandstone, probably brought from Filey Brig, twelve miles distant. Many of the stones forming this monument were of great size, some weighing a ton, or more, and marking the burials as of great importance. With the bodies—both burnt and unburnt—were found fine specimens of pottery and stone implements. The find of bodies, implements, weapons, ornaments, pottery, &c., was rich in the extreme.

The first barrow was sixty-six feet in diameter, and still five feet high, though greatly ploughed down. It was formed of earth and chalk. At a point four feet S.W. from the centre, and at four feet above the natural surface, was the body of a woman, on the left side, contracted, the head to the N.W., left hand on the hip, right

* Pre-Historic Times as Illustrated by Ancient remains, &c., by Sir John Lubbock, Bart., F.R.S., 1869.

hand up to the face. Before the face was an urn, of the "food vessel" type, completely covered on the exterior with zigzag markings by a pointed instrument. Lying before the chest was a small bronze awl or bodkin. At six feet N.E. of the centre were part of the skull and other bones of a man, crushed by the plough. At and about the centre the mound was entirely made of earth, in distinct conical layers. The section showed that through these, long after the mound had been built, a cylindrical excavation, equal in diameter to the immense grave in the solid chalk below, had been cut, and the excavation had been filled in with chalk and earth mixed. In the "filling in," at a point three feet above the line of the natural surface, was a layer or cap of burnt earth and charcoal, five inches in thickness. Six inches below, and at the east side of the circle, was the body of a very young child, on the left side, contracted, the head E. by S.; and six inches below it was the body of a woman, on the left side, contracted, the head E.N.E.; the right hand across the chest, just under the chin; left hand on knees. Before the chest was a flint knife which had been newly made, perhaps for the purposes of the interment; and beyond the knife was a bronze drill, having a square centre, and both ends pointed. Behind the body was a bronze awl and a flint flake, and close by a beautiful "drinking cup" of very unusual pattern, the outline presenting a waved contour. The cup was eight inches high, and a charming novelty. The burial of this woman had disturbed that of a man, whose head was to the S.E., and portions of the others were undisturbed. This burial had been contracted, on the left side, and possibly the bronze awl might have belonged to it.

Still descending, and at the line of the natural surface, was the body of a young woman, under twenty years, contracted on the left side, head to the E., and both hands in front of chest. Behind the skull was another drinking cup, six and a half inches high, ornamented over the whole surface with horizontal, vertical, zigzag and chevron lines, made by a peculiar implement of bone or wood, toothed, and the apices of the teeth squared off, thus making angular grooves in the clay. All the different patterns of ornamentation were by the same implement, and altogether unusual. The body was laid on a bed of charcoal, and under the feet was a flint knife. Conterminous with the upper cutting and its varied burials, was the grave in the rock, which proved

to be filled in carefully with mould only. The grave proved to be more than nine feet in diameter, and ten and a half feet deep. From this point the measurement is from the line of the natural ground, and at four feet deep were two large flags of oolitic sandstone, sea-worn, standing on edge nearly against the south side. Lying beside horizontally there were two large stones, four feet eight inches by two feet, and three feet six inches by three feet ten inches, and on the top of these, hanging slightly over, was another, two feet by one foot ten inches. On removing these it was found they lay on a fourth of equally large size, but all in the mould, and forming no part of the splendid cists below. They seem to have been spare blocks thrown heedlessly into the grave. Two feet below all this the top of a magnificent double cist was touched, the cist resting on the floor of chalk, at the bottom of the immense grave. The cists formed but one structure, and had been erected, as was shown by the slabs overlapping, at the same time. They were N.N.W. by S.S.E.

The second tumulus at Rudstone was seventy-eight feet in diameter, and six feet high, formed of chalk and earth, in layers. This mound had a trench round it (within the circumference), four feet wide at top, tapering to two feet at bottom, and three feet six inches deep, in solid chalk. The inner diameter was forty feet. On the encircling line of the trench, at intervals of twelve to sixteen feet, occurred divisions of unexcavated chalk, not coming to the top, forming, in fact, a series of troughs round the barrow. Upon the natural surface of the ground was a stratum of hard, tempered, cement-like soil, eight inches thick ; so hard as almost to resist the pick. At eleven feet south-east of the centre, and a foot above the natural surface, was the body of a woman, contracted on right side, and head to N.E. by E., left arm to knees, right hand to the face. Behind the head was a bone pin. At six feet S.S.E. of centre, and sixteen inches above natural surface, was the body of a man, on the left side, head to E.S.E. The body was in a circular hollow, cut through a layer of chalk, and resting on the tempered floor. At thirty feet E.S.E. of centre, was a body on the right side, head to S.S.W. Being near the surface, this burial was destroyed greatly by driving sheep-net stakes. At sixteen feet S.E. and E., in a hollow three feet diameter, and four inches into natural ground, lined with wood slightly charred, was a very young child, head to the south, on right side. Before the face was a nearly globular urn, four inches high,

ornamented by punctured impressions over the whole surface. At seven feet S.E. by E., and twenty inches above the natural surface, was the body of a young person, on the right side, head to S. by W., hands up to the face. At four feet south of centre was a body on the left side, with head to S.E. by S., lying on the natural surface, the right hand on the knees, the left up to the face. One foot above this body was another of a young person lying on the left side, with head to west. On the east side, and just within the circumference of a central circular grave, and six inches above the natural surface, was the body of a man on the right side, head west, right hand under the head, left up to breast. There was a plank of willow on each side of the body, the planks being three feet six inches long, and one foot six inches apart. It was not a coffin, but merely a wooden protection on each side. In front of the head was a food vessel urn, with four unpierced ears, covered with impressions of the end of some implement. Close by the urn and skull was a most beautifully perfect and large barbed arrow point of flint, fresh as the day when made. The point was away from the head, and it is probable the shaft (decayed) was held in the right hand when interred. With the arrow was part of an ammonite—a sort of charm. The body of the person buried was that of a round-head (the *Brachycephali*), with the lowest development of forehead and the most debased skull conceivable for that of a human being. As with the first described barrow, so in this, the original mound had been cut through to form the central grave below, and, in filling in, bones of more than one body, and portions of a ribbed pattern drinking cup had been mingled with the earth. At one foot four inches east of the grave, on the natural surface, was a body on the right side, head to N.N.W., hands together in front of knees. At the centre was the grave in the chalk, six and a half feet E. and W., and five and a half feet N. and S., and five feet deep. Three feet six inches deep in the grave was a burnt body, and below it, on the bottom, a man on left side, head S.E., left hand on the hip, right hand to face. The burial was in a dished cavity, of which the chalk formed the bottom, and the sides were built of burnt earth and charcoal. Behind the hip, and just out of the “dish” was a very thin flint scraper. In the grave, and through nearly the whole mound, were remains of disturbed bodies, showing the tumu-

lus to have been used again and again. Mixed with the material forming the hill were some animal bones, all broken for marrow; a very large quantity of chips, cores, &c., of flint, ten round flint scrapers (one most beautiful in work, and another smoothed by long use), four saws, two drills (one curved), three knives and a chipped knife or spear point, all of flint; three stone pounders, one small pierced hammer-stone (used), and a beautiful jet armlet, two and a quarter inches in diameter. The skulls from the several finds, with the exception of two, were decidedly brachycephalic. The proceedings excited great interest in the district, and among the many visitors were Sir H. Boynton, Bart., Major and Mrs. Mussenden, Mr. R. Wyse, and Mr. H. S. Harland, Malton; Captain Barnes, Captain Beauvais, Rev. Mr. Oxley, Rev. P. and Mrs. Royston, Mr. Cape and Mr. Tindall, Bridlington; Mr. Lovel, Weaverthorpe; Mr. Payne, Nottingham; Mr. Walmsley, Mr. and Mrs. Lowish, Mr. Harding, and Mr. Harding, jun., Mrs. and the Misses Hordern, Burton Agnes; Mr. Butterfield, Mr. Milner, Kilham; Mr. Daggett, and Mr. Porritt.

The remains found in these tombs and tumuli appear to belong to some of the earliest of the British tribes. It will be seen that the materials used by those whose remains were therein interred, consisted chiefly of stone, bone, horn, and clay. They do not appear to have been altogether ignorant of the use of bronze made from copper and tin, but to have possessed it in very small quantities. Their supply of iron was still smaller, and shows that that most valuable of all the metals, though abounding in the hilly districts in which they resided, was of no use to them, in their ignorance of the mode of working it.

But whilst the much greater portion of the remains discovered in Yorkshire appear to belong to a feeble and unwarlike race, others have been found which belonged to the time when the Britons fought bravely for their independence, even against the irresistible warriors of Rome. The following are accounts of the remains of two ancient British warriors, whose remains have been discovered within the last forty years, one of whom seems to have belonged to the race of British charioteers described by Cæsar and Tacitus, and to have been buried not only with his arms, but with his war chariot and his faithful steeds. They appear to have been men of noble form, and one of them, at least, of remarkable size.

The remains of the first of these British warriors were discovered at Grimthorpe, near Scarborough, and are thus described :—

The Tumulus at Grimthorpe, near Scarborough.—This tumulus was opened in the month of July, 1834, by Mr. Beswick, the owner of the estate on which it was situated, and Mr. Alexander, of Halifax. At the depth of six feet from the surface the spade struck against a hard substance, which proved to be a quantity of oak branches loosely laid together. These being removed, an immense log of wood, situated north and south, seven feet long, by three broad, presented itself, to the great satisfaction of these antiquaries. At one end of the log was what was at first supposed to be a rude figure of a human face; which circumstance, together with the large size of the log, led the finders to believe that they had discovered one of the Druidical remains of the ancient Britons. On attempting to remove this log on the following morning, it seemed at first to have been broken by the force employed; but on the fractured portion being lifted up, it was found to be the lid of a coffin, the lower part still remaining in the clay, containing a quantity of fluid, in which a human skull was visible; and on the water being thrown out it was soon found that the coffin contained a perfect skeleton. The bones were carefully removed, the other contents of the coffin examined, the lower part taken up, and the whole conveyed to the Scarborough Museum, where they are now deposited. The coffin proved to have been made from the trunk of an oak—

“Ingentem quercum, decisisque undique ramis
Constituit tumulo—”

roughly hewn at the extremities, and split with wedges. It had been hollowed by chisels of flint about two inches in width, but must have been cut down with some much larger tool, the marks of its strokes being nine inches in length. The outer bottom of the coffin was in length seven feet nine inches. In the bottom, near the centre, was an oblong hole, about three inches long by one wide, most probably intended to carry off any fluids arising from the decomposition of the body. There is little difference in size between the lid and body of the coffin. No resin appears to have been used to fix the lid. It was merely loosely laid on, and kept in its place by the uneven fracture of the wood; the broken portions corresponding on each side when brought into their proper places. The skeleton found in the coffin was quite perfect, and

of an ebony colour.* The bones are much larger and stronger than those of a more recent date, exhibiting the lines and ridges for the attachment of the muscles with a degree of distinctness rarely if ever witnessed at the present day. But the most remarkable portion is the head, which is beautifully formed and of extraordinary size. The skeleton, which has been articulated, measures six feet two inches, and the interior of the coffin being only five feet four inches, accounts for the disordered state in which the lower extremities were found, as they must necessarily have been doubled up so as to admit of being placed within it. The body—which had been laid on its right side, with the head to the south and its face turned towards the rising sun—had evidently been wrapped in the skin of some animal, the hair of which was soft and fine, resembling that of a sheep, or perhaps more nearly that of a goat, but not quite so long; and this skin had been originally fastened at the breast with a pin of horn or bone.

The weapons, &c., found in this coffin consist, 1, of the head of a spear or javelin, formed of brass or some other composition of copper; it was much corroded, and had at the broad end two small rivets used to attach it to a shaft, which, from the shortness of the rivets still remaining, must have been broad and thin. 2. The flint head of a small javelin, a beautifully formed ornament, of either horn or the bone of some of the larger cetaceous tribe of fishes. The under side is hollowed out to receive some other appendage; and there are three perforations on each side for the purpose of fastening it by means of pins. It had probably been the ornamental head of a javelin, of which the metal head had formed the opposite extremity. Its symmetrical form, which would not disgrace the most expert mechanic of the present day, combined with the gloss upon it, gives it quite a modern appearance. 3. Rude arrow-heads of flint. 4. An instrument of wood resembling in form the knife used by the Egyptian embalmers; the point not sharp, but round, and flattened on one side to

* This remarkable circumstance was thus satisfactorily accounted for by the dean of Westminster (Dr. Buckland), in a communication addressed by him to the editor of the *Literary Gazette*:—"The extraordinary and, as far as I know, unique condition of the bones, preserved by tannin and converted to the colour of ink, had resulted from the tannin and gallic acid which was in the green oak trunk which formed the coffin, and in its very thick bark. The conversion of the flesh into adipocere must have been occasioned by the ready admission of water through the line of junction of the lid with the body of the coffin, or through the hole cut in the bottom. The clay found in contact with the body probably contained sufficient iron pyrites to afford the sulphate of iron, which uniting with the tannin and gallic acid, have formed, together with the water within the coffin, an ink of precisely the same materials as that in common use."

about half its length. The opposite extremity is quite round.

5. A pin of the same material as the ornament of horn or fish-bone; it was laid on the breast of the skeleton, having been used to secure the skin in which the body had been enveloped.

6. Fragments of a ring of horn, composed of two circles connected at two sides. It was of an oval form, too large for the finger, and was probably used for fastening some portion of the dress. By the side of the bones was placed a kind of dish, or shallow basket of wicker-work, of round form and about six inches in diameter. The bottom had been formed of a single piece of bark, and the side composed of the same, stitched together with the sinews of animals, which, although the basket fell to pieces on exposure to the atmosphere, are still easily to be observed in the fragments and round the edges of the bottom. Attached to the bottom was a quantity of decomposed matter, the remains, as was supposed, of offerings of food, either for the dead or as gifts to the gods. Laid upon the lower part of the breast of the skeleton was a very singular ornament, in the form of a double rose of ribbon, with two loose ends. It appeared to have been an appendage to some belt or girdle; but, like the basket, it fell to pieces immediately on being removed. It is very uncertain of what it was composed. It was something resembling thin horn, but more opaque and less elastic. The surface had been simply though curiously ornamented with small elevated lines. Lastly, a quantity of vegetable substance was also found in the coffin. It was at first believed to be rushes, and being afterwards macerated, although the greater portion of it was so decomposed that nothing but the fibre remained, in one or two instances the experiment was so far successful as to distinguish a long lanceolate leaf resembling the mistletoe, to which plant they most probably belonged. This supposition was strengthened by the discovery of some few dried berries among the vegetable masses, about the size of those of the mistletoe. They were, however, very tender, and very soon crumbled to dust.

The Tomb and Horses of an ancient British Warrior.—In a paper by the Rev. E. W. Stillingfleet—in illustration of some antiquities discovered in tumuli on the Wolds of Yorkshire, and published in the York volume of the *Archæological Institute*—is found a remarkable account of the discovery of two distinct skeletons of what Mr. Stillingfleet designates British charioteers. The

following are extracts :—"In a cist almost circular, excavated to the depth of above a foot and a half in the chalky rock, and on a nearly smooth pavement, the skeleton of a British charioteer presented itself, surrounded by what in life formed the sources of his pride and delight, and no inconsiderable part of his possessions. The head of this charioteer was placed to the north, with an eastern inclination. He rested on his back, his arms crossed on his breast, and his thigh and leg bones, when bared, presented to the eye what may be termed a singular grained work ; both the thigh and leg bones appearing to have been crossed in opposite directions. Very near to his head were found the heads of two wild boars. Inclining from the skeleton on each side, had been placed a wheel ; the iron tire and ornaments of the nave of the wheel only remaining. The tire of the wheel, to the east of the body, was found perfect in the ground ; but unfortunately it broke into several pieces on removal, owing to its corroded state. Small fragments of the original oak still adhered to the iron. In diameter these wheels had been a trifle more than two feet eleven inches ; the width of the iron tire about one inch five-eighths. The diameter of the ornaments of iron plated with copper, and varnished green, which had encircled the nave as a kind of rim, was very nearly six inches. The circumference of the wheel, on the western side, had been forced much out of its shape, evidently by pressure of the earth. Each of these wheels had originally rested on a horse, the bones of which were found under or adjoining to them ; the head of each horse being not far from that of the charioteer, on opposite sides. From the size of their leg-bones, these horses were of unequal height ; but probably neither of them reached thirteen hands. Perhaps they may be regarded as progenitors of the Shetland, Welsh, or forest breeds of our own days ; at any rate, they corroborate, by the most certain of all evidence, the historical record, that the British horse was diminutive in his size, and swift in his motions." "On the western side of the British charioteer, were found two very singular articles—of the length of five inches, round at one end, and carved at the other—of iron plated with green varnished copper, which our workmen called linch-pins. Besides these (in different parts of the barrow, but all I, think, on the western side), were found two little-rings, three-quarters of an inch in diameter ; and five buckles, semi-circular, of various sizes, in some of which the tongue still remained. These

buckles undoubtedly belonged to the harness, and their fellows may be seen in the Stanwick collection."

The two latter tombs probably belonged to warriors of the British Celtic race, though in the former there were implements of stone as well as bronze; but most of the earlier ones appear to contain the remains of men of an earlier and less energetic race, more ignorant of the arts of war, and probably of those of peace also, than the Celts. It is now well ascertained that there were other races scattered over western Europe, before the Celts arrived from the East. Some of these races do not appear to have been at all wanting either in intelligence or in courage; whilst others seem to have been a very inferior race physically, if not mentally. We are informed by writers who have carefully investigated the language of the Celts, that they were not the race who gave to Britain the name which it now bears, and which it has borne from two hundred to three hundred years before the Christian era. It is stated "that the Celtic inhabitants," whom the Romans found in this island, "did not call themselves Britons, and that no complete and satisfactory explanation of the name of Briton can be discovered in any of the Celtic dialects. Neither does the word seem to have originated with the Greeks or Romans; although it has come down to us in the works of their writers. According to a learned writer on the origin of the names of places and persons, the name of "Britannia" is derived from that family of languages of which the Basque of Spain and the Lapland language of northern Europe are the sole living representatives. Hence it is inferred that the earliest knowledge of the island of Britain which was possessed by the Greeks and Romans, was derived from the Iberic or Basque mariners of Spain, who, either in their own ships or in those of their Punic masters, coasted along the shores of Gaul, and thence crossed to Britain at some very early period of the world's history. The name of Britannia contains in its first and second syllables the Basque, or as it is sometimes called the Euskarian, suffix *etan*, which means in that language a "district" or country. We are informed that this suffix of *etan* is found in the names of many of the districts known to or occupied by the Iberic race. Thus it occurs in Aquitania, or Aquitaine; in Lusitania, the ancient name of Portugal; in Mauritania, the country of the Moors; as well as in the names of very many of the tribes of ancient Spain,

such as the Cerretani, Ausetani, Laletani, Cosetani, Vescitani, Lacetani, Carpetani, Oretani, Bastitani, Turdetani, Suessetani, Ede-tani, and others.*

It is rather remarkable that the name which these early visitants and perhaps settlers in Britain gave to the word water, in their native Basque language, is at present borne by one of the rivers of Yorkshire, and also by one or two streams in Gaul or France. The Yorkshire river thus named is the river Ure, and it appears from the researches made by Humboldt into the Basque language that "ure," or "ura," is the name for water in that very ancient language. The word *ura*, "water," is found in a variety of names still in use in Spain, as Asturia (compounded from the words *asta*, "a rock," and *ura*, "water"), Illuria, Uria, Verurium; from *ura*, "water" and *bi* "two" are derived the words Urbiaca, Urbina, Illurbida, and many others.† Names derived from the ancient Basque or Euskarian language, are found through the greater part of Spain, and through those parts of France which belonged to the ancient territory of the Aquitani; and it is quite possible that words derived from this root may be found in the names of rivers, mountains, and even of very ancient towns in Britain, if carefully sought for. We mentioned the instance of the Yorkshire river Ure as exactly corresponding with the name of water in this very ancient language. It appears that this race formerly occupied a considerable portion of the south and west of Europe, including a part of the present France, a larger part of Spain, and the Islands of Sicily, Sardinia, and Corsica, in the Mediterranean.‡ Its founders are said to have been a powerful people while the Greeks and Romans were still barbarians. As Humboldt says:—"Their history manifestly reaches back beyond the periods of languages which we regard as ancient, namely, those of the Greeks and Romans, and if we seek a point of comparison, can only be placed on a line with the pre-Hellenic idiom of the old Pelasgi."§ The word Britain and the name of the river Ure certainly appear to belong to this very ancient language, and it is probable that careful research might show that other ancient British words are derived from this source.

It would appear, however, that while one portion of the Basques were a powerful race, another portion were mere savages, or rather

* Words and Places, by Rev. Isaac Taylor, p. 60. † Prichard's Physical History of Mankind, vol. iii, p. 27.

‡ Ibid. vol. iii. p. 29.

§ Humboldt's Untersuchungen.

harmless children, like the Lapps of the present time, and the Finns or Fenns mentioned by Tacitus. Dr. J. C. Prichard states, in his learned researches into the "Physical History of Mankind," that some of the skulls found in the tumuli of northern Europe, including Britain, belong rather to the Finnish nations than to Indo-Europeans. In proof of this he mentions that the orbits of the eyes are small and deeply set under strong, prominent eyebrows: there was also a considerable depression of the nasal bones between the eyebrows. A still stronger feature of resemblance to some of the Lappish, Finnish, and other kindred races, is the lateral projection of the zygoma, giving to the skull much of that pyramidal form which is so remarkable a feature of the Turanian nations. Dr. Prichard adds, "Some remains found in Britain give reason to suspect that the Celtic inhabitants of this country had, in early times, something of the Mongolian or Turanian form of head." He adds, "However this may have been, we recognize in both countries remains belonging to two successive periods: I mean those of the Stone and of the Copper age."* He further adds, "The relics of copper or brazen ornaments are evidently of a later date than that long series of ages which raised the great majority of the numerous barrows, which are spread both in the British Isles and in the northern regions of Europe."†

The Celtic Race in the Brigantine Territory.—There is abundant evidence, from the statements of the Roman and Greek historians relating to the Britons, in the times of Cæsar and Tacitus, that they belonged chiefly, if not altogether, to the Celtic race, like the neighbouring Gauls, who then formed the mass of the population, not merely of the British Islands, but of Gaul and Spain, and probably even of a portion of Germany; and whose descendants are still found amongst the people of Wales, of the Highlands of Scotland, of the greater part of Ireland, and of the western provinces of France. From the very earliest times of which we have any knowledge of the history of the Celts, and of the Cimbri, who seem to have belonged to the Celtic race, they appear to have been a most warlike people, thoroughly acquainted with the art both of making and using weapons of war, and altogether different from the feeble races which used weapons of flint and bone as their only means of making and repelling attack. Herodotus, writing nearly 500

* Prichard's Physical History of Mankind, vol. iii. p. 20.

† Ibid. p. 21.

years before the Christian era, speaks of the Celts as dwelling beyond the Pillars of Hercules, and bordering on the territories of the Cynesians, "who," he says, "lie at the extremity of Europe to the westward." He again speaks of the Celts as living beyond Pyrene (supposed to be the mountain chain of the Pyrenees), on the borders of the ocean; and a third time he mentions that the river Ister, or Danube, flows through all Europe, beginning from the Celts, who, as he repeats, are next to the Cynetæ, who inhabit the remotest parts of Europe towards the west.* Yet the modern investigations into the language of all the Celtic tribes clearly show that they originally belonged to the Indo-Germanic, or Aryan race, which originated in the east, and gradually extended its conquests from India, which was considered to be the furthest limit of the east, to Spain, Gaul, and Britain, then believed to be the furthest limits of the western world. It is not very improbable that the Celtic tribes found occupying this country in the time of Cæsar and Agricola, were the descendants of the Cimmerians, who are mentioned by Homer, 850 years B.C., as inhabiting the furthest regions of the earth;† and whom Herodotus describes as the conquerors of great part of western Asia, and of extensive regions of Europe, previous to the founding of the Persian empire.‡ But it is not credible that this warlike race should have been ignorant of the use of the metals, from which the weapons of war were made, at any time after it penetrated into Europe. In their early conflicts with the Romans, B.C. 390, the Celts or Gauls fought successfully, captured the city of Rome, and conquered a considerable portion of Italy; and although they were ultimately vanquished by the Romans, it was not from want of formidable weapons of war, but from inferiority of military skill.

The Language of the Celtic Britons.—It has been clearly shown during the last forty years, that the language which was spoken in Britain, in great part of Gaul (the France of modern times), in a considerable portion of Spain, and even in a part of Germany, at the time of the Roman invasions of those countries, in the centuries immediately preceding and following the Christian era, belonged to the Celtic family of languages, and greatly resembled the language, which is still spoken in the principality of Wales, in the Highlands of Scotland, in the Isle of Man, and in all those parts

* Herodotus, ii. 33, iii. 60, iv. 49.

† Homer's *Odyssey*, book viii.

‡ Herodotus, i. 6.

of Ireland in which the Erse or Irish language is still known. Dialects of the same language were also spoken in Cornwall within the last hundred years, and in the wilder parts of Cumberland and Westmoreland nearly down to the reign of Queen Elizabeth. Similar dialects are still spoken in France, in the western departments formed from the ancient province of Brittany; and a very considerable portion of the French language, as spoken in the more primitive districts of France, and even of the French of literature and of polite conversation, is derived from the Celtic language, mixed with a good deal of Latin, and with a little German. This was also the case with the language spoken in ancient times in a considerable part of the Spanish peninsula, in which the names of a large portion of the rivers, mountains, and more ancient towns and cities, are evidently derived either from Celtic roots, or from the older Basque. In those ages the Celtic language seems even to have been spoken in Germany and on the shores of the Baltic, for Tacitus, in speaking of the *Æstii*, who dwelt on the eastern shore of the Suevic sea, says that their language resembled the British.* In fact, according to the statement of the most learned of modern writers on the Celtic language, it was then spoken over much the greater part of western Europe, and from that age has been preserved in the Gallic, Belgic, and British names of men, cities, rivers, plants, and even in a few words and phrases of the Greek and Latin writers. These names and words have been preserved in sufficient numbers to render it quite certain that they belong to the same family of languages as the Welsh, the Gaelic, and the Erse of modern times.†

A number of the ancient names of persons and places used amongst the Brigantes, who were the Celtic inhabitants of the present Yorkshire and the rest of the North of England, have been preserved and handed down by Tacitus, Ptolemy, and the author of the Antonine Itinerary, whoever he may have been; which show that nearly the whole of the names, both of persons and places, used in the Brigantine territory belonged to the Celtic language. A considerable number of names of natural objects, especially those of rivers, mountains, promontories, and marshes, have also come down from age to age, and have reached the times in

* C. Cornelli Taciti Germania, cap. 45.

† Grammatica Celtica, è monumentis vetustis tam Hibernicæ Linguae, Britannicæ Dialectis Cambricæ, Cornicæ, quam Armoricæ; necnon è Gallicæ Priscæ Reliquiis Construxit, J. C. Zeuss, Ph Dr., Histor. Prof., Lipsiæ, 1853.

which we live, that are not less certainly of Celtic origin, many of them being used in Wales, in the Highlands of Scotland, and in Ireland, to the present day. Even the names of a few towns and villages not mentioned by any ancient author, but which are still in existence, can be shown to be derived from Celtic roots. What is still more remarkable, the names that our Anglian ancestors gave the ancient Britons, whom they conquered and expelled, can be found in the names which some of the towns, villages, and parishes of Yorkshire bear to the present day. It may be desirable and interesting to give a list of names of Celtic origin found in this county, and we shall arrange them in alphabetical order, as most convenient for reference. We shall also give, along with these ancient British words, the few Latin and Greek names of places found in Yorkshire, which go back to the times of the Roman occupation, or are connected with it:—

CELTIC, ROMAN, AND GREEK WORDS FOUND IN THE NAMES OF PERSONS AND PLACES IN THE TERRITORY OF THE BRIGANTES, OF WHICH THE PRESENT YORKSHIRE WAS A PART.

Aberford, from Aber, “a confluence,” and probably from the Celtic word Ford, “a way or road.”—Zeuss, “*Grammatica Celtica*,” p. 184.

Abus, the name given by Ptolemy to the river Humber, from the Celtic word Aber, “a confluence” of waters, a name most appropriate to an estuary which receives nearly all the rivers of Yorkshire, Lincolnshire, and Nottinghamshire, and discharges their waters into the ocean.—Zeuss, G. C. p. 189.

Acaster Malbis, the name of a Roman camp on the river Ouse, the first syllable probably derived from Ac, a Celtic word for “water” (Owen’s Welsh Dictionary), and from the Roman word *castrum*, “a camp.” Malbis probably belongs to the Norman times, and is the name of a family. Acaster belongs to the age of the Roman occupation of Britain, though rather to the Latin than the Celtic language.

Acaster Selby, the name of another Roman camp, formed for the defence of York and of the navigation of the Ouse. The first of these two words also belongs to the age of the Roman occupation. The termination by, in Selby, shows it to be of Danish or Norwegian origin.

Acomb, probably from the Anglian word Ac, “an oak,” or the British word, Ac, for water; and the British word Cwm or Comb, which means “a hollow in the hills.” The word has still the same meaning in Welsh.

Aire, river, “bright or gentle,” also found in the word Arar, a stream which Cæsar describes as flowing with incredible gentleness; in the modern river Aire in France; in the Aar, which flows through Aargau in Switzerland, and, as Dr. Owen mentions in his “*Dictionary of the Welsh Language*,” in several small streams in Wales, at the present time. The author of “*Words and Places*” says:—“The widely diffused root Ar causes much perplexity. The Arar, as Cæsar says, flows *incredibili lenitate*; while, as Coleridge tells us, the Arve and the Arveiron “rave ceaselessly.” We find, however, a Welsh word Araf, “gentle,” as well as the Celtic Arw, “violent,” and a Sanscrit root Arb, “to ravage or destroy.” From one or other of these roots, according to the character of the river, we may derive the names of the Arw in Monmouth, the Aray in Argyle, the Aire in Yorkshire, the Ayr in Cardigan and Ayrshire, the Arre in Cornwall, the Araglin and the Aragadean in Cork, the Arro in War-

wick, the Arrow in Hereford and Sligo, the Arrière, the Erve, the Arve, the Darcq, the Arve, and the Arveiron in France, the Arga, and three rivers called Arva in Spain, in Italy the Arno and Era, in Switzerland the Aar and the Arbach, in Germany the Ohre, Ahr, Isar, Aurach, Orre, Erl, Erla, Arl, Orla, Argen, and several mountain streams called the Are; besides the well-known ancient names of the Darus, the Araxes, the Ar-ar-ar, the Naparis, the Aras, and the Jaxartes.—("Words and Places," by the Rev. Isaac Taylor, p. 228.) Probably, in the case of the Yorkshire Aire, the name is intended as a contrast to the neighbouring river Wharfe, which is said to derive its name from its rapid and winding course.

Alauna, from All, "white," the name of a large river now known as the Lune, which forms a portion of the north-western boundary of Yorkshire, and of another and smaller Yorkshire stream which flows into the river Tees.—(Zeuss, G. C. p. 38.) Hence the numerous rivers and streams known as Allens, Ellens, Aulns, Aulness, Alns, and other similar names. The Romans Latinized Al, "white," and Afon, "a river," into Alauna.—Rev. Isaac Taylor's "Words and Places," p. 225.

Arden, from Arden, "a forest," or a lofty wood, found in the name of the forest of Ardennes in Gaul, in Henley-in-Arden in Warwickshire, and in Arden in Yorkshire.—"Words and Places," by the Rev. Isaac Taylor, p. 238.

Ardwick-le-Street. Here we have four languages in the name of one place. Ard is the Celtic word for "high or lofty" (Zeuss, G. C. p. 20); Wick, the Anglian or Saxon word for a village; that is followed by the French word *le*; and then by Street, derived from the Latin word *stratum*, which preserves the recollection of the strata, or roads formed by the Romans in all parts of Britain. There are more than fifty places in England which derive a portion of their modern names from the same circumstance.

Baildon, from the Anglian word Bael, "a funeral pile," and the Celtic word Don, "a hill, or camp."—Zeuss, G. C. p. 29.

Bain, a stream in Wensleydale named from the British word Ban, "white."—Rev. Isaac Taylor's "Words and Places," p. 226.

Belisama. The name that Ptolemy gives to the river Ribble, which rises in Yorkshire and flows down into the sea through Lancashire. All the Syrian gods were supposed to have wives, and Belisama was the wife of the Syrian god Baal. Camden thinks that the name Baal is found in the last syllable of the name Ribble or Rybel. It is probable that Ptolemy was of the same opinion, and therefore named the Ribble the Belisama.—(Camden's *Britannia*, p. 615. Edition 1590.) The first syllable of the modern name, which also was probably part of the ancient name, namely Ri, is derived from the Welsh or British word Rhe, "swift."—"Words and Places," by the Rev. Isaac Taylor.

Brigantes. This is the name which Tacitus, and all the other great writers of antiquity, gave to the British inhabitants of that part of England which includes the present county of York. It means "highlanders" or mountaineers, in the Celtic language, and is derived from the word Briga, "a height." The Romans, who no doubt learned this word from the Celts, probably of Britain, afterwards applied it to other hill tribes, especially to the Swiss dwelling in the neighbourhood of Bregentz, who are spoken of by Ammianus Marcellinus as the Brigantes.—Zeuss, G. C. p. 101.

Bryan Askham. The first word is probably from the Celtic word Bryn, "a ridge," and the second, from the Anglian words Ask, "an ash tree," and Ham, "a home."

Burgwallis. This is an Anglian or Saxon name, meaning "the hill" or "fortress" of the Welsh. The term Welsh is the name which the Angles and Saxons gave to the ancient Britons, so that Burgwallis is the hill of the Britons. The ancient Germans gave the name of Walcher to strangers and foreigners, and gave it to the Britons, who called themselves, as they still do, Cymri. To the present time the Germans call the Italians Walchers, and Italy, Walchland. Goethe, in his travels in Italy, describes the first Italian postillion whom he met with in Italy as "a genuine Walcher," that is a real Italian.

Caer Caratuc. The British name of Catterick in Yorkshire, according to the earliest British writers. See *Cataractonium*.

Caer Ebrauc. The British name for Eboracum or York, as given in the works of the

earliest British writers, Gildas and Nennius. *Caer* means "a fortress" or "city." Much uncertainty exists as to the origin of the word *Ebrauc*, or *Eboracum*. We shall state what is thought of the origin of the name of that celebrated city under the word *Eboracum*.

Calder River. The last syllable of this word is derived from the Celtic word *Dur* or *Dwr*, signifying "water." Dr. Prichard gives a list of forty-four ancient names containing this word *Dwr*, "water," in Italy, Germany, Gaul, and Britain. Amongst these is *Calder*. The first syllable *Cal* is probably derived from the name of the Gael, the oldest of the Celtic races of Britain. The whole word may mean "the river of the Gael;" though some suppose it to mean "the winding water," and others "the woody water," or "water of the woods."—Taylor's "Words and Places," p. 209.

Cambodunum, the Winding Hill, or Hills, from the Celtic word *Cam*, "winding," and *Dunum*, "a hill," the name of the second station from *Eboracum*, or York, to *Mancunium*, or Manchester, and supposed by Camden to be at Almondbury, near Huddersfield, though others place it at Greetland, at Slack, or at Elland.—Reynolds's "Iter Britanniarum," p. 191. Camden's "Britannia," p. 559.

Car, from *Cors*, "a marsh;" *Corsen*, "a marsh plant."—Zeuss, G. C. p. 300.

Camunlodunum. This place, mentioned by Ptolemy ("Geographia," p. 108), is generally supposed to be *Cambodunum*, mentioned above, and seems, at all events, to have been situated to the west of *Eboracum* or York. If it was a separate place the name is probably derived from *Dunum*, "a hill," and *Camulus*, the name of the British Mars, or god of war.

Cartismandua. The beautiful name of the queen of the Brigantes, mentioned by Tacitus and other writers. Professor Phillips believes that this name is expressive of locality, and thinks it probable that it is derived from the Celtic words *Cathair ys maen du*, "the chair of the black stone," from her seat of sovereignty by the black Druidical stones, the precursors of the Roman camp of *Isurium*, the present *Aldborough*.—(Phillips' "Yorkshire," p. 201.) Zeuss mentions the Celtic words *Car*, "a friend," and *Cared*, "beloved," as the roots of most of the Celtic words commencing with *Car*; as *Caractacus*, *Cartismandua*, and many others.

Cataractonium, or *Catterick*, which is first mentioned in Ptolemy's *Geography*, is generally supposed to be derived from the Greek word *Katarakton*, "a cataract" or "waterfall." But it has been thought in recent times that there was some Celtic name resembling this, which Ptolemy supposed to be the same word. In the old British language *Catu* means "a battle," and it is not improbable that that may be the origin of one of the syllables. Professor Phillips derives *Cataractonium* from the Celtic words *Cathair rigd*, "fortified city."—(Phillips' "Yorkshire," p. 201.) It is not very probable that a purely Greek word would be found, in Yorkshire, as a name of a place, in that age.

Cawood, from the British word *Cae*, signifying "a hollow" or "a field," and the Anglian word *Woodu*, "a wood."

Cheven, or *Sheven*, from *Cefn*, a Celtic word meaning "a ridge," well describing *Otley Cheven*.

Colne, river, from the Latin word *colonia*, found in the names of the cities of Lincoln and Cologne, and in the rivers *Colne* in Essex, and in Yorkshire.—Rev. Isaac Taylor's "Words and Places," p. 276.

Cotness, "the woody promontory," from *Coit* "a wood," and *Ness*, the Anglian name for a promontory.

Craven, perhaps from *Cragen*, a district of crags.

Creyke Castle, from *Careg*, "a rock," the castle being situated on a lofty rock overlooking the ancient forest of *Galtres*.

Cumberworth, from *Cumber*, or *Cumbri*, the ancient name of the Britons, found in the word *Cumberland*, and the Anglian word *Worth*, which means "an inclosure," generally on the bank of a river or lake.

Dearne, probably from *Dwr*, "water."

Dee. A small river near *Sedberg*, named from the words *Du-wy*, "dark water."

Delgovitia. A town in Yorkshire mentioned in Antonine's *Itinerary*, the position of which is supposed by Burton to be *Market Weighton* in the East Riding, the ancient Anglian name

of which place was Mickleweighton or Wayton, "the large town on the way," or Roman road. Burton derives the name of this place from the British word *Delw*, which Zeuss also informs us (p. 160) means "an image." Burton identifies Delgovitia with Godmanham near Market Weighton, which was a great place of idol worship in the time of the Angles, and is likely from its name to have been so likewise in the time of the Celtic Britons.—Burton's "Itinerary of Antoninus," p. 90.

Dent, from *dens* or *dent*, "a tooth," used figuratively for a mountain.

Derventio; the town on the Derwent, mentioned in the first "Iter" of Antoninus. The name is evidently derived from the river which flows through it.

Derwent; the river Derwent, named from *Dur gwin*, "the fair water."

Dewsbury, from *Dew*, the British word for God, and *Bury* the Anglian word for hill, meaning "God's hill."

Don, or Dun, which simply means "the water" or "the river," and is found in the river Don in Russia, and, with a slight alteration, in the Donau or Danube.

Dove, a river from *Du*, "black."

Dourwater, from *Dwr*, "water."—Rev. Isaac Taylor's "Words and Places," p. 222.

Drax, *Ax* "water."—Rev. Isaac Taylor's "Words and Places," p. 213.

Dunum Sinus, "the bay of the hill," from the British word *Dun* or *Dunum* and the Latin word *Sinus*; or *Douron Kolpos*, according to the original Greek of Ptolemy.

Easeburne, from *Uisge* or *Esk*, "water," and *Burne*, the Anglian word for a stream.

Eboracum. Of this celebrated name Dr. J. C. Prichard says:—"I find no probable etymon for names containing Ebor, except the Welsh *Aber*, which means "a confluence" of waters. The use of this word *Aber* was not confined to Wales, since Aberdeen and Aberbrothwick are well known in Scotland. *Havre de Grace* has probably hence its name—" (Prichard's "Physical History of Mankind," vol. iii. p. 128.) It is also probably found in the first part of the French name *Evreux*.

Esk. The river *Esk*, from *Uisge*, a Celtic name for "water."

Forest, the Celtic word for a forest, found in Sherwood Forest, the Shirewood Forest.

Foss. From the British word *Fhoss*, or perhaps from the Latin word *fossa*, "a ditch or entrenchment," so named from forming part of the fortifications of York. *Catfoss* is "the wood of the Foss," and *Foston* is probably "the town of the Foss."

Gabrantuicun. A place on the coast, near Flamborough Head, supposed to be named from *Gaber*, the Celtic word for "a goat."

Galtres, "the wood of the Gael," or ancient Britons.

Garforth, the woody promontory; from *Gara*, "a promontory," and *Firth* or *Forth*, "a wood" or "inclosure."

Greta, from *Rhe*, and *A*, "the swift water."

Humber. Probably a corruption of *Aber* or *Iber*, both of which mean "a confluence of waters." Professor Philips mentions a Gaelic word *Comar*, also a confluence of two or more waters, as a probable origin of the word *Humber*. But Ptolemy names this great river the *Abus*, and *Aber* is probably the original name.

Kimberworth. The same word as *Cumberworth*, mentioned before.

Laiths, "a moist plain."

Leven. A river of Cleveland, supposed to be so named from the British word *Leven*, or "gentle."

Lune river. "The *Alauna* of the Romans," derived from the word *All*, "white."

Masham, from the Celtic word *Maes*, "a field," or plain, and the Anglian word *Ham*, "a home."

Nid, or Nith, the name of a river, from *Nedd*, or *Neth*, "winding," or "whirling."

Ocelum Promontorium, believed to be Flamborough Head, and to be named from the Celtic word *Uchel*, "a height or promontory."

Ouse river. Probably a corruption of the Celtic word *Uisge*, "the water."

Ouseburn, from *Uisge*, "water," and *Burne*, "a stream."—Rev. Isaac Taylor's "Words and Places," p. 222.

Penhill. The head or chief hill at the end of Wensleydale, from the Celtic Pen, "a head," and the Anglian Hill.

Penistone. From Pen, "the head," meaning "the head of the rock" or hill.

Pennigant, "the head of the plain," from Pen, "the head," and Gwent, "the plain or valley."—"Words and Places," Rev. Isaac Taylor, p. 243.

Reeth. A town on the Swale, from the Celtic Rhyd, "a ford" ("Words and Places," by the Rev. Isaac Taylor, p. 268); or Rit, also "a ford."—Zeuss, G. C. p. 169.

Rhosbury. The name of one of the principal mountains in the North Riding, from Rhos, a Celtic word for "a moor," and Burg or Bury, the Anglian word for "a hill."

Patrington. A town of the Parisii, who occupied a part of the present East Riding of Yorkshire, supposed to be derived from the word Petuar, "four."—(Zeuss, G. C. p. 324.) It is not certain, however, whether it was four miles or four pillars, or some other object.

Rivelin. The stream of Velinus, or Belinus, one of the ancient British gods.—Zeuss, G. C. p. 102.

Rye. A swift river, from the word Rhe, "swift" or rapid, which well describes the character of the Yorkshire stream of that name.

Strafforth. The name of one of the Yorkshire hundreds, derived from *stratum*, "a road," and Fforth, which also means "a road," both referring to the Roman road passing through that part of Yorkshire.

Tadcaster. From *castrum*, "a camp," and some unknown British or Anglian word.

Tame. The name of two rivers in Yorkshire, as well as the much more celebrated river Thames, in a slightly different form; derived from the British word Tam, meaning "spreading," or quiet.

Tees, river, perhaps from Es, "water," and the Celtic preposition Ti or Di "at" prefixed to it. The Tees, the Taff, and the Tavor are perhaps instances of this usage, which is also found in the German languages, in Zermat, Andermat, Amsteg, and Utrecht (*ad Trajectum*).—Rev. Isaac Taylor's "Words and Places," p. 221.

Treton. Perhaps from the British word Tre, meaning "a house" or a village. It is said to occur only once in Yorkshire.

Washburn, from Uisge, "water," and Burne, "a stream."

Wealswood. An Anglian word; but meaning the "wood of the Britons," named the Wealas or Welsh by the Angles and Saxons.

Wensleydale, the first syllable probably derived from the British word Gwyn, meaning "white."—Rev. Isaac Taylor's "Words and Places," p. 209.

Went, river, from Gwent, "white" or fair.

Wharfe river. Probably from the same root from which the river Garve in Rosshire, Garry in Perthshire, Yare in Norfolk, Yarrow in Selkirkshire, and Garonne in France, are derived, which is said to be the Celtic word Garw, "rough or violent."

Wisk. A river of the North Riding, the name of which is derived either from the Gaelic word Uisge, meaning "water," or the Welsh word Wysg, meaning "a current."

The above Celtic words are only a few specimens of a language which once prevailed over the greater part of Western Europe, including the whole of the British Islands. It is probable that the ancient British language received a considerable number of Latin words, during the period of nearly four hundred years of the Roman occupation of Britain. But the infusion of the Latin language into the Celtic dialects of Britain was not nearly so extensive as its infusion into the Celtic dialects of Gaul, Spain, and Northern Italy, which derived an entirely new character from the influence of the Latin language. The language of Britain appears to have been

chiefly Celtic for a considerable time after the departure of the Romans, and it is still Celtic in the more mountainous parts of Great Britain and of Ireland. Very few of the words that still exist in the names of places and objects found in Yorkshire, are purely Celtic. They are most of them mixed up with Anglian, Frisian, and Danish words, which have formed the staple of the language of this district from the time of the Anglian and the Danish conquests. This we shall show in a subsequent part of this work.

Ptolemy's Account of the Brigantine Territories.—Whilst we are indebted to the historian Tacitus for the clearest and best account of the political events by which the Brigantine territory, of which the present county of York formed the larger and more fertile portion, was united to the Roman empire, we owe our earliest account of the geography of that district to Claudius Ptolemy, of Alexandria in Egypt.* This writer flourished in the second century of the Christian era, and was one of the contemporaries of the Emperor Hadrian, who may be regarded as the organizer of the Roman province of Britain. The points respecting which Ptolemy professed to inform the ancient world in his Geography, were the positions of all the principal states, cities, ports, estuaries, and promontories in the countries extending from the Atlantic Ocean on the west to the furthestmost points, north, east, and south, of Europe, Asia, and Africa, known to the Greeks and Romans. The first book of this celebrated work commences with an account of the British Islands, and it is a remarkable proof of the extent of the author's researches that he should have ventured to give a detailed account of these islands, taking Hibernia or Ireland first, although it never formed a portion of the Roman empire; and also to give a similar account of the northern parts of Britain, which were never subdued by the Romans, as well as of that part of Britain, now forming England and Wales, which at that time constituted the scarcely pacified Roman province of Britain. In the second chapter of his first book Ptolemy names the ports, rivers, estuaries, bays, and headlands on all sides of Britain; and then the names of the principal tribes in the interior, and the chief towns of each. He also professes to give both the latitude and the longitude of every place or object of interest

* Claudii Ptolemæi Geographiæ Libri Octo, Græce et Latine, ad Codicum manu Scriptorum Fidem. edidit Dominus Frid. Guil. Wilberg. Essendæ, 1838. Cap. i. p. 101, cap. ii. p. 104.

mentioned by himself, in this and the whole eight books to which his great work extends. Some idea may be formed of the extreme difficulty of this undertaking, when it is stated that the latitudes and longitudes of no less than 140 places are mentioned in Britain alone, and those of several thousands in other parts of the world. This attempt at an accuracy which was quite unattainable with the few observations and the imperfect instruments of that age, has had the effect of producing numerous errors, both of latitude and longitude, in a large portion of the places mentioned by Ptolemy. Nevertheless there is every reason to believe, that the whole of them were founded on observations or calculations made on the spot by himself or others; and it gives one a very high impression, not merely of the industry of Ptolemy and the earlier geographers, but of the immense pains taken by the Roman government, that even an attempt should have been made to fix the position of so many places, especially in the British Islands, at a time when not more than one half of their total area was subject to the Roman dominion, and when even the portion which they professed to rule was very partially subdued.

It has been supposed that Ptolemy, being a contemporary of the Emperor Hadrian, was assisted in collecting the immense number of observations which he must have made, or had made by others, in preparing his work, by the influence or authority of that great lover of knowledge and that indefatigable traveller. Hadrian was a warm friend of learned men, and his court was constantly crowded with philosophers, orators, poets, and mathematicians, for whom he always had a particular esteem. As emperor, he resided for a considerable time at the city of Alexandria, at the time when Ptolemy was at the head of the men of science of that great seat of Greek intelligence; and it is very probable that he may have used his authority throughout the Roman empire to obtain for the geographer the information which he required.

A circumstance which renders this the more probable is that the Emperor Hadrian was himself an indefatigable traveller, and spent the whole of his reign in visiting every province of his great empire. We are told that it was a saying of Hadrian, that "an emperor ought to imitate the sun, which enlightens all corners and regions of the earth," and that he accordingly visited every province of his empire, employing no less than seventeen years in this

inspection, commonly travelling on foot with bare head, and making no difference between the summits of the Alps and the burning sands of Syria. In the second year of his reign, he visited Campania and other regions of Italy. In the next year he set out for Gaul, where he examined the principal cities and fortresses. From Gaul he went into Germany, where he spent a considerable time in reviewing and training the Roman troops then in garrison along the banks of the Rhine and the Danube. From Germany the emperor returned into Gaul, and thence passed over into Britain. There he organized Britain into a Roman province, and fixed its northern boundary, building the great wall eighty miles in length, extending from the mouth of the Tyne to that of the Solway Frith. This Vallum became the northern limit or boundary of the Roman empire, and although the line of frontier was pushed forward to the narrow pass between the Forth and the Clyde at a subsequent time, that advanced position was soon abandoned, and the line adopted by Hadrian became, and continued to be, the northern boundary of the Roman empire in Britain. It appears also from the inscriptions on Roman milestones found in Leicestershire, in the north of Lancashire, and at other places, that some, if not all the great lines of military road formed in Britain, were constructed in the reign of Hadrian, whose name the *Milliaria* bear even to the present time.

Having ordered and regulated affairs in Britain, Hadrian returned to Gaul, and thence proceeded into Spain, where he held an assembly of the states of Spain, and rebuilt at Taraco the temple which Tiberius had there erected in honour of Augustus. From Spain the emperor returned to Rome; but we find that soon afterwards he was at Athens, whence he went into the East, where he prevented a war with the Parthians, by a conference with their king. The year following Hadrian returned from the East through Asia, and visited Cilicia, Lycia, Pamphylia, Cappadocia, Bithynia, and Phrygia; ordering temples, squares, and other edifices to be built at his expense in most of the principal cities of those provinces. He likewise visited the islands of the Archipelago, and arrived in Achaia in the beginning of the next year, of which he spent the remainder at Athens. From Athens he travelled into Sicily, it is said, from a wish to see the top of Mount Etna, and thence he returned to Rome in the beginning of the following year, where he seems to have remained two years regulating the affairs of the empire, but

never forgetting the more distant provinces ; for it was during this period that he rebuilt, at his own expense, the cities of Nicomedia, Cæsarea, and Nice in Asia Minor, which had been almost destroyed by an earthquake. In the thirteenth year of his reign the Emperor Hadrian again set out on a new progress, passing first into the Roman provinces of Africa, where, by bestowing many favours upon the people, he gained the affections of all ranks of men. From Africa he returned to Rome, but in the beginning of the fourteenth year of his reign he again went into Asia, where he consecrated several temples. He next visited Cappadocia, and thence passed into Syria, through Palestine into Arabia, and thence into Egypt. He continued in Egypt all this and the following year, and restored at his own expense the city of Alexandria, which had been almost destroyed by the Romans, granting to its inhabitants all their ancient privileges. From Egypt he passed into Libya, and the parts about Cyrene, where he is said to have killed a lion of monstrous size with his own hand in a hunting party. In the following year he left Egypt and returned to Syria, where he stayed several months. Then after visiting Thrace and Macedon, and paying another long visit to Athens, he returned to Italy, having thus spent almost seventeen years in travelling in the several provinces of the empire; from the territory of the Brigantes and the Caledonian Wall, to the wildest parts of the African and Arabian frontiers. About the year afterwards the Emperor Hadrian died at Baia in Italy, after a life chiefly spent in the development of the resources of the vast empire of which he was the ruler. He was succeeded by Antoninus Pius, a sovereign equally benevolent and wise, to whom it is highly probable we are indebted for that great account of the Roman roads contained in the "Itinerary of Antoninus." Whether he was the author is indeed doubtful; but it is highly probable that it was drawn up in his reign, and was intended to afford to himself, his successors, and all the people of the Roman empire, the information which was necessary to enable them to travel with ease and safety from one end of the Roman empire to the other.

The account of the Brigantine territory given by Ptolemy, in his Geography, relates partly to the coasts, and partly to the interior. After describing the northern, the western, and the southern coasts of Britain, he proceeds to describe "the north-eastern and southern coast looking towards the German ocean." This is not altogether an accurate description of the eastern side of Britain, but even

Ptolemy had a very imperfect knowledge of the general line of the coasts of Britain at that time.

After mentioning several other points lying to the north of the Brigantine coast, including the estuary of the Tay, that of the Forth, that of the Tyne, and that of the Wear, he proceeds to describe the ports, harbours, and headlands on that portion of the Brigantine coast which now forms part of the county of York. The first point which he mentions is the port or harbour of Dunum Sinus, which is generally supposed to be either Whitby or Dunsley Bay, close to the port of Whitby. He then mentions another apparently very commodious harbour; this he describes by the name of Gabrantuicum, adding *opportunus sinus*, which may be translated the "well-harboured bay." Opinions are divided as to whether this is Scarborough or Filey Bay, or whether it is some point farther south. Proceeding southward, Ptolemy next mentions the promontory of Ocelum, which is generally supposed to be Flamborough Head, the loftiest and most commanding promontory on that part of the coast. Then proceeding still further southward, he mentions the mouth of the river Abus, which can be nothing else than that of the river Humber, the great port of the Brigantine territory, as it is now of the county of York. To the south of this point Ptolemy leaves the Brigantine territory, first mentioning the Metaris Æstuarium, which is supposed to be the Wash; then the Garienni fluvii Ostia, supposed to be the mouth of the river Yare at Yarmouth, and after mentioning two or three places of lesser celebrity, the Tamesæ Æstuarium, or the estuary of the Thames. The latitudes and longitudes of these places are all mentioned by Ptolemy, but they are nearly all wrong, the calculations having been formed on imperfect observations.

In the "Introduction to Antoninus' Itinerary of Britain," by Reynolds, published at Cambridge in the year 1799, we find the following observations on this part of Ptolemy's account of what we may call the Yorkshire coast. The commentator begins at the south with the Humber and proceeds northward, which, however, is not the order of the original work. After describing the Thames, the Yare, the Wash, and other points to the south of Yorkshire, he proceeds as follows:—

"The next observation leads to the mouth of another river named Abus, always considered as the Humber. This determination cannot be well disputed, because it is the only river in these parts. The longitude of the river is made the same as that of the Yare in Norfolk, which must be nearly two degrees east of it, nor is this error in longitude corrected in any subsequent observation.

"The promontory Ocelum has been generally interpreted as the Spurn Head, but that headland cannot well be divided from the Humber; whereas Ocelum is represented to be ten minutes in latitude and fifteen in longitude distant from that river. Ykill and Ocelum in the British language signifies a 'promontory,' as Camden states, and the name may be supposed to be applied, in the present case, by way of eminence. This will lead our attention to the most remarkable promontory in this neighbourhood, which is Flamborough Head, much larger than the Spurn, and perhaps the largest in the island. The only circumstance in favour of the Spurn appears to have been the fixing Pretorium at Patrington; but it will be seen that it is much more probable this ancient town occupied the site of modern Flamborough (or Bridlington).

"The bay of Gabrantuici may have been situated at Filey, but more likely at Scarborough.

"Another bay called Dunum, is placed by Camden north of Whitby, where the small town Dunsley seems to preserve the name.

"A river, called by Ptolemy *Vedrae fluvii Ostia*, is the last place mentioned upon this coast, within the limits of Antonine's "Itinerary," and this is decided by the same antiquary to mean the river Wear, in the palatinate of Durham. Horsley prefers the Tyne, from its size and consequence; and had Ptolemy himself surveyed our coasts, there would have been good reason to expect that he would have elected the place the most remarkable, where two occurred near to each other; but since his personal knowledge could not influence his choice, it is not to be wondered at that a larger river should not be mentioned by him, while a smaller neighbouring has that honour. Beyond this river the longitudes and latitudes become still much less to be depended upon, representing Scotland (*Caledonia*) in a form very different from the truth."*

In Professor John Phillips' excellent work on the "Rivers, Mountains, and Sea-coasts of Yorkshire," the author makes the following observations on the points of the Yorkshire coast mentioned in Ptolemy's Geography. He says:—"By universal consent the Humber estuary claims the old name of Abus. At some point north of this a projecting part of the land was called 'Ocelum Promontorium.' Camden supposed the modern name of Kilnsay, a little north of the promontory of the old name Ocelum, to be derived from the British Y-kill, 'a promontory,' low tongue, or narrow track of land. But the words of the Greek author imply elevation, really a cape or headland, not a mere extension of land. For Akron seems to be merely a translation of the British name given before, as that is clearly derived from Uchel, 'elevated.' By later writers, especially Mr. Walker, of Malton, the place of this promontory is fixed at Flamborough Head.

"Further to the north was Gabrantuicum Sinus—the Bay of the Gabrantuici (also called the Well-havened Bay). Camden places this at Sowerby (as this were "Sure Bay"), near Bridlington, deriving the name from Gafran, the Welsh for goat, an animal which he says was abundant on Flamborough. By later writers it is carried further north to Filey Bay (as if that were the "Portus Felix"). Still

* Antoninus' Itinerary of Britain, by Reynolds. Introduction, p. 104.

further to the north we have Dunum Sinus, which by general consent, following the dictum of Camden, is placed at Dunsley Bay, near Whitby. According to this reference Ptolemy took no notice of the Tees.*

The particulars given by Ptolemy as to the interior of the Brigantine territory consist, chiefly, in the statement that it extended across Britain, from what we now call the German Ocean to the Irish Sea; and that a portion of it was inhabited by a tribe named the Parisii, who seem to have occupied the eastern coast near the river Humber. In addition to this, Ptolemy mentions that the Sixth Victorious Legion occupied Eboracum, or York. He also gives the names of the different towns of the Brigantes, and that of the one town possessed by the Parisii. He likewise states the latitude and longitude of all those towns; but none of the calculations or observations on which the latitudes and longitudes are founded can be at all relied upon. The following is the substance of Ptolemy's statement with regard to the Brigantes:—

“South of the Elgovæ and the Otadeni, stretching from sea to sea, are the Brigantes, amongst whose cities are—

Greek.	Latin.	Long.	Lat.
Epeiakon,	Epiacum,	18° 30'	58° 30'
Quinnouion,	Vinnovium,	17° 30'	58° 00'
Katourraktonion,	Cataractonium,	20° 00'	58° 00'
Kalaton,	Calatum,	19° 00'	57° 45'
Isourion,	Isurium,	20° 00'	57° 40'
Rigodounon,	Rigodunum,	18° 00'	57° 30'
Olikana,	Olicana,	19° 00'	57° 30'
Eborakon,	Eboracum,	20° 00'	57° 20'
Under Eborakon is written “The Sixth Conquering Legion.”			
Kamounlodounon,	Cambodunum,	18° 15'	57° 00'
Beside these, about the Well-havened Bay, are the Parisoi and the city of—			
Petouaria,	Petuaria,	20° 40'	56° 40'

With regard to several of the above places there is little or no difficulty in identifying them with modern towns, cities, or villages. Eboracum, the headquarters of the Sixth Conquering Legion, is no doubt the city of York; Cataractonium is Catterick Bridge; Calatum is Tadcaster; Isurium is Aldborough; Olicana is Ilkley; and Rigodunum is Ribchester, on the river Ribble, in the adjoining county of Lancaster. There is some doubt as to the modern places

* The Rivers, Mountains, and Sea-coasts of Yorkshire, with Essays on the Climate, Scenery, and Ancient Inhabitants of the County: by John Phillips, F.R.S., Author of Illustrations of the Geology of Yorkshire, and of Geological Map of the County. London, 1853.

with which the other names correspond, viz., Epiacum, Vinnovium, Camounlodounon, and also with regard to Petuaria. In a subsequent part of this work we shall notice all those places, and their supposed positions.

The existence of a tribe of Parisii within the Brigantine territory has always been a subject of discussion. There is no doubt that there was in Gaul a tribe named the Parisii, from whom the famous city of Paris takes its name. They seem, from the earliest times of which we have any record, to have occupied the valley of the Seine; and as several of the Gaulish tribes appear to have founded colonies in Britain, there is nothing very improbable in the supposition, that the Parisii of the valley of the Seine may have founded a colony on the bank of the Abus, or Humber. Some writers have indeed considered this to be highly improbable, and have even thought that Ptolemy has made a mistake in the name, and that these colonists were Frisii, and not Parisii. But this is a mere conjecture, and cannot be received without much doubt, as it brings one of the Germanic tribes to Britain some hundred years before the great German migration into this country. There is some slight confirmation of the opinion that there were Germanic tribes in Britain, even previous to the time of Ptolemy, derivable from the statement of Tacitus, in his account of the British tribes, that "the red hair and large limbs of the inhabitants of Caledonia pointed clearly to a German origin," and it is quite possible that these peculiarities of complexion may have extended further south than the country of the Caledonians. On considering the whole matter, Tacitus seems to have come to the conclusion that the Britons were sprung from the Gauls, though it is perhaps not very improbable that there may have been some districts occupied by tribes of German origin. We should not, however, venture to change the name of Parisii to Frisii on so slight an evidence as an observation of Tacitus as to the size of the limbs, and the colour of the hair, of some of the northern tribes of Britain.

The Brigantes appear to have been not merely the most numerous of the British tribes, stretching from sea to sea, but also to have been a maritime people, and to have founded colonies in Ireland, who also bore the name of the Brigantes. It is the opinion of Dr. Prichard, that Ireland was mainly peopled by the Celtic inhabitants of Britain, and that the Brigantes had a considerable share in the peopling of that country. There is no great difference

between the language of the Celtic inhabitants of Ireland and that of the Gael of Britain; and it is very probable that the Celts who peopled Ireland, in their progress westward, may have made their way across Britain at the points where the two islands approach most nearly to each other. This would be from the coasts of Cumberland, Galloway, and Cantyre. Galloway was no doubt named from the Gael, who were amongst its earliest inhabitants; and Cumberland from the Cymry, the ancestors of the modern Welsh.

The commerce of Britain with Gaul appears to have been very considerable, from the time when the Romans over-ran and conquered Gaul, in the time of Julius Cæsar. When Strabo wrote his account of Britain in the reign of the Emperor Augustus, there was already a considerable commerce in copper, tin, skins, hides, and in slaves, who in those times were articles of merchandise in all parts both of the Roman and the barbarian world. There is every reason to believe that most of these branches of trade would increase rapidly, when the more fertile parts of Britain had been conquered and at least partially civilized by the Romans, when great roads had been formed in every part of Britain, and when secure ports of communication had been established on both sides of the British Channel. Even the trade in British slaves may have been kept up by wars along the northern border of the empire. As far north as the coast of Yorkshire, there were ports and harbours known to form safe places of refuge for shipping, and points of trade for the merchandise of the district. The river Humber is full of ports of that description, and there are many others along the sea-coast from the mouth of the Humber to the entrance of the Tees, and still further north. One great object of the works of Ptolemy, and the other ancient geographers, was to supply the navigators of the ancient world with the knowledge necessary to enable them to trade with the most distant regions. In the north-western extremity of Europe he describes the coasts of Britain and Hibernia; of Belgic Gaul, and of Great Germany, as far as the river Elbe; the Cimbrian Chersonese, which includes the present Jutland and great part of Denmark; and the southern shores of the Suevic or Baltic Sea, as far as the mouths of the river Vistula.* These charts and plans must have been of great value in developing the trade of the regions around the German Ocean and the British seas with each other, and with other parts of the Roman empire.

* Ptolemæi Geographia, lib. ii. cap. 10 p. 148.

Their value in this respect would be greatly increased, within the limits of the Roman empire, by the formation of commodious and well-constructed roads in Britain and all the other provinces of the empire.

The Roman Roads through the Brigantine Territory.—One of the earliest, the most effectual, and the most permanent means by which the early inhabitants of this part of Britain were brought into connection with the civilization of the Roman world, was by the construction of great lines of military road, commencing at the Roman Wall, the limit or northern boundary of the Roman empire, and extending over the whole of Europe. The Vallum, or Roman Wall, as it has been named in modern times, stretched from the mouth of the river Tyne to the estuary of the Solway. These roads ran southward through what we now call Durham and Yorkshire, to Eboracum or York, to London, to every part of the present England and Wales, and to the Kentish coast at Rutupiaë, now Richborough, near the sites of the modern towns of Sandwich and Dover. From Rutupiaë the Romans kept up their communication, across the Channel, with Gaul and the continent of Europe. The roads which thus ran through Britain, from north to south, were continued southward through the whole of Gaul, to the Alps. Crossing the Alps they also extended to Rome, and to the most southern point of Italy, Brundisium; which was then, as, under its modern name of Brindisi, it seems likely again to become, the point of communication from Europe to the East.

From these main lines of military road which thus ran from the borders of Caledonia, through Britain, Gaul, and Italy, to the shores of the Mediterranean, innumerable secondary lines also branched out to the west and to the east. Those extending to the west traversed the whole of Gaul and of Spain, to the Atlantic Ocean, and the mouths of the Loire, the Garonne, the Douro, the Tagus, and the Guadalquivir, at Cadiz, or Gadir, perhaps the oldest city in Europe. Beyond the Pillars of Hercules, or what we now call the Straits of Gibraltar, similar roads were carried throughout the whole of the Roman empire in North Africa, to the mountains of Atlas, and the northern borders of the African desert. To the east of the main line from Britain to Rome and Brundisium, the military roads extended to the banks of the Rhine, almost from the point where it enters the German Ocean to the point at which it rises in the mountains of Switzerland. Down the

Danube, also, the Roman roads extended by way of the present Vienna to the Lower Danube, across which river the Emperor Trajan built a bridge, in the same age in which the Romans established their dominion in Britain. To the south of the Danube the military roads extended into Greece, and to Byzantium, afterwards named Constantinople, through the whole of Asia Minor into Syria and Palestine, to the banks of the Euphrates, and to the ruined walls of Jerusalem. Thus one of the earliest effects of the conquest of Britain by the Romans was to bring the Britons into connection with this great line of roads, extending to every province of the Roman empire, and connecting all the great cities of the ancient world with each other. To facilitate travelling on these roads, stations were formed at distances of from ten to fifteen or twenty miles from each other, with resting-places, and services of post-horses for the transmission of government and other despatches, as well as for the use of travellers. Thus were the people of Britain brought into communication with the civilized world, and ceased to be *toto orbe divisos, Britanni*, as they had been down to the times when the conquest of their country was effected by the Romans.

The Roman roads were planned by the most eminent Greek engineers in the service of the Roman republic and the earlier emperors, and were founded on a survey—greatly resembling our Ordnance Survey—commenced in the time of Julius Cæsar, and which occupied above thirty years in completing. There were no doubt subsequent surveys made, as Britain and other new provinces were added to the empire. Everywhere, even to the most northern limit of the Roman empire in Britain, the roads were constructed with consummate skill, immense solidity, and with a thorough appreciation of all the natural features of the country through which they ran. Within the limits of the present county of York some of these roads are carried over mountain passes nearly a thousand feet above the level of the sea; and crossing the higher part of the mountains of Westmoreland and Cumberland, to the western extremity of the Roman Wall, near Carlisle, one of these roads, still named High Street, is carried over a height of more than 2700 feet above the sea level.*

The number of Roman roads in Britain, described in the Itinerary of Antoninus, is fifteen, and of these four lines pass through the

* Ferguson, Northmen in Cumberland p. 29.

present county of York.* All the fifteen are evidently what we now call "main-trunk" lines of road; for there are at least half a dozen other lines of road, evidently the work of the Romans—which can be clearly traced, and have indeed been recently laid down in the Ordnance survey of Yorkshire—which are not described in the Itinerary of Antoninus, besides many more in different parts of England. Some of the most important lines in a commercial point of view, including the greater part of those formed in the later period of the Roman occupation, are not mentioned at all in the Itinerary of Antoninus. Amongst these were the great line of road running through the adjoining county of Lancaster, from Warrington to the town of Lancaster, which seems to have been made in the reign of the Emperor Philip, who seized upon the empire in 244, as appears from the *milliaria* or milestones; and the road from York to the neighbourhood of the present town of Leeds, as well as several other roads in different parts of the county of York. By giving a brief sketch of the course even of the Roman roads described in the Itinerary of Antoninus, we shall be able to show how completely all the most fertile and populous parts of Britain were united with each other; and how the whole of them were connected with the great military positions of Britain, namely, with the Roman Wall; with Eboracum, the military capital of Britain, and the head-quarters of the Sixth Legion; with Deva or Chester, the head-quarters of the Twentieth Roman Legion; with Isca Silurum in Monmouthshire, the head-quarters of the Second Roman Legion; with London, the commercial capital of Britain, from the time of the Romans; and with Rutupiaë, near Sandwich, Dubris or Dover, and Lemanis or Lymne, near Hythe, the ports of communication from Britain to the continent of Europe.

Before giving an account of the roads in Britain, the author of the Itinerary of Antoninus commences by stating the distance across the Channel from Gessoriacum in Gaul, the present port of Boulogne, to Rutupis, or Rutupiaë, which is described as the port of Britain, and is situated in the county of Kent, on the banks of the river Stour, a little distance from the port of Sandwich, where there are the remains of a great Roman fortification, which are full of interest even at the present day. The distance across the Channel, from the present Boulogne to this point on the Kentish coast,

* *Iter Britanniarum*, or that part of the Itinerary of Antoninus which relates to Britain; with a new Comment, by the Rev. Thomas Reynolds, A.M., Cambridge, 1799.

is said to be 450 stadia. The stadium, which was the measure of sea distances employed by the Greek engineers in the service of Rome, was about equal to the modern furlong. The stadium is generally computed to have been 125 paces, each pace of five feet, so that eight stadia formed the Roman mile, or 1000 paces (*mille passuum*). Plutarch says, in his "Lives of the Gracchi," that a mile is little less than eight stadia.*

Iter 1.—The first Iter described by Antoninus runs entirely through the ancient country of the Brigantes, and for the greater part of its course through the present county of York. It starts from the Roman Wall (*a Limite, id est, a Vallo*), and extends to Prætorium, an important point on the coast of Yorkshire, the position of which is not absolutely fixed, though it is supposed to be either the mouth of the Humber at Patrington, near Hull, or to be Bridlington, near Flamborough Head, the most conspicuous promontory on the Yorkshire coast. The distance from the Limit, or the Roman Wall, to Prætorium, is stated to be 156 Roman miles. The Roman mile, or *mille passuum*, was 1000 paces of five feet each, and the great historian Gibbon looks upon ten English miles to be equal to eleven Roman. Some other authorities consider the proportions between the Roman and the English mile to have been as 967 to 1000.†

Iter 2.—The second Iter, which is by far the greatest and longest of all the Roman military roads in Britain, also passes through Yorkshire from north to south, as far as York, and then from east to west, as far as the hills which separate Lancashire from Yorkshire. Thence it extends westward to Mancunium or Manchester, and Deva or Chester; and then runs southward by Wroxeter, the ancient Uriconium, situated near the modern Shrewsbury, to Penkridge in Staffordshire, and then through the modern counties of Warwick, Bedford, and Hertford to London, and thence through the county of Kent to Rutupiæ. This may be regarded as the main trunk line of Britain, from the extreme north to the extreme south, or south-east, of the Roman province of Britain, and nearly every other road in Britain was connected with it, either directly or indirectly.

The second Iter is described as extending from the Vallum or

* A Commentary on Antoninus his Itinerary, or Journeys of the Roman Empire, so far as it concerneth Britain, by William Burton, B.C.G., p. 32. Temple Gate, London, 1658.

† Reynolds' Antoninus, pp. 50, 51.

Roman Wall, the limit or northern boundary of the empire, to the port of Rutupis. It is stated to be 431 Roman miles in length; but it is considerably longer in English miles, being about 530, according to the calculations of modern writers who have carefully compared the distances between the various stations, according to the distances of the high roads of England. There are, indeed, some great mistakes in the lengths, as given in the Latin original. For instance, it is stated that the distance between Eboracum or York, and Mancunium or Manchester, is only 47 miles, while the real distance between York and Manchester by the highways is at least 67.* There are a few other mistakes at different points; but the general tendency of these errors is to represent this great road, extending from the British Channel and the coast of Kent to the Roman Wall, as 431 miles in length, instead of about 530 miles, which it must really have been.

To show how completely this line of road described in the second Iter was the main line of Britain, it is only necessary to mention a few of the points which it touched in its course from north-west to south-east. It commenced near the present city of Carlisle, but further down the Solway, so as completely to command the southern bank of that estuary. It began at a place which is described as Blatum Bulgium, and is supposed to be Bulness, on the Solway; whence it extended inland to Luguwallium, on the site of the modern city of Carlisle. Hence it was carried over the mountains of Cumberland and Westmoreland, by Brougham Castle or Brovanicis, into Yorkshire. From this point it ran eastward, down the south bank of the river Tees, by Brough or Verteris, and Bowes or Lavatris, to Cataractonium or Catterick Bridge in Swaledale. Thence it turned southward to Isurium or Aldborough, at the junction of the Ure and the Swale rivers, and so ran down the vale of York to Eboracum. We have already shown, in our account of the first Iter, that there was a road from Eboracum, or York, to the Prætorium on the German Ocean, at a place named Prætorium, which was either at the mouth of the Humber or near to Flamborough Head. Indeed, there is no doubt that there were Roman roads from York to both those points, many traces of which formerly existed, though cultivation has destroyed some of them within the last hundred years. The only doubt is as to which of these roads to the coast terminated

* Antoninus' Itinerary of Britain by Reynolds, p. 176. Cambridge, 1799.

at the place named Prætorium. That must have been a place of great importance as the summer or the marine residence, or both, of the Roman prætor, who was the real governor of this part of Britain, if not of the whole British province.

After reaching York the line of the second Iter turned to the west, and the road proceeded through Calcaria or Tadcaster to Cambodunum. This Camden supposed to be Almondbury, near Huddersfield, but other writers have been disposed to place it at Greetland, at Slack, or at Eland, on the banks of the river Calder, somewhat nearer to the present town of Halifax. It is clear, however, that there were at least two lines of road through this mountainous district, if not three; and it is impossible to fix the precise line from Cambodunum to Mancunium or Manchester, or the precise position of Cambodunum, owing to the great mistake in the distances, as given in the Itinerary, of which we have already spoken. However, there is no doubt that the road passed westward from Cambodunum, probably with two branches running through different valleys and mountain passes, but joining when they reached the level country in the neighbourhood of Manchester.

From Mancunium, or Manchester, the road traced in the second Iter ran westward to Chester, then known as Deva, and the head quarters of the Twentieth Roman Legion. From Chester it ran south to Uriconium or Wroxeter, near Shrewsbury, where the remains of the ancient Roman city have recently been laid open. Thence it ran south-eastward through what we now call Staffordshire, Warwickshire, and Northamptonshire, to Verulamium, now St. Albans, in Hertfordshire, and thence on to London. From London the road described in the second Iter ran through the county of Kent, near Rochester and Canterbury, to the port of Rutupiæ (*ad portum Rutupis*), near the old Roman ruins of Richborough, on the banks of the river Stour, and two or three miles distant from the present town of Sandwich. Richborough, though standing on an elevation of fifty or sixty feet above the river Stour, is situated in the midst of a great plain, in a position most favourable for the landing and the disembarking of troops; and hence it was that the Romans kept up their communication with the Continent so long as they remained in Britain. Dubris, or Dover, was also used, but the harbour of Rutupis was much safer for such vessels as were employed by the Romans; and the position was much less liable to be interrupted by an insurrection among the Britons

against their Roman masters. It will be seen from the above particulars, that the second line of road thus described was the main line of communication from the northern limit of Roman Britain at the Vallum, or Roman Wall, to the south-eastern extremity of their dominion in Britain, on the coast of Kent.

Iter 3 is not in the northern part of Britain, but is connected with the second *Iter*, which runs from the Roman Wall through Eboracum, and with a winding course to London. The third *Iter* extends from London, which was already a very considerable commercial city, to Dover on the Kentish coast (*ad portum Dubris*), being a direct line of communication with that place.

Iter 4 describes a third line through the county of Kent, commencing at London and extending *ad portum Lemanis*, which is supposed to be Lymne, near Hythe, where there are still great Roman remains.

Iter 5 is another great trunk line of road extending from London to the neighbourhood of Carlisle, and running through Yorkshire from Danum, the present Doncaster, up the vale of York and the vale of Mowbray through Lagecium, or Castleford, on the river Aire, Eboracum or York on the river Ouse, and Isubrigantum or Isurium of the Brigantes, the present Aldborough, at the confluence of the Ure and the Swale, to Catterick. A little beyond that place it turns up into Teesdale and reaches the neighbourhood of Carlisle by way of Lavatris, Verteris, and Brocavum or Brougham, to Lugu-vallium, in the neighbourhood of the present city of Carlisle.

Iter 6 extends from London northward through Verulamium or St. Albans, and Ratis or Leicester, which was considered the centre of Britain, to Lincoln or Lindum, where it seems to have terminated. Lindum or Lincoln was a strong Roman fortress, besides being a place of great trade.

Iter 7 ran from London westward and south-westward by Winchester, or Venta Belgarum, to Reading and to Chichester.

Iter 8 commenced at the city of York or Eboracum, and ran southward to London, the distance being stated to be 227 miles. The stations in Yorkshire, after leaving York, are Lagecium, which is supposed to be Castleford, and Danum, which is well ascertained to be Doncaster. From that point the line ran through Agelocum, or Littleborough in Nottinghamshire, Lincoln, Leicester, and Verulam or St. Albans, on to London.

Iter 9 ran through the eastern counties to London, commencing

at Venta Icenorum, which is either the present city of Norwich or Caistor, in its neighbourhood, and extending through Sitomagus or Stowmarket, in Suffolk, Maldon or Camulodunum, in Essex, and Cæsaromagus or Widsford, to London.

Iter 10 extended from Glanoventa, which is either Cockermouth or some place on the coast of Cumberland, through the lake district to Galava, or Keswick, and then southward through Ribchester and Manchester to Whitchurch in Shropshire, where it joined the great line running through Wroxeter or Uriconium, into the southern and western parts of Britain.

Iter 11 was a road commencing at Segontium, on the Menai Straits, and running through North Wales to Deva or Chester.

Iter 12 was a line of road beginning at Maridunum or Carmarthen, in South Wales, and running along the coast of South Wales to Isca Silurum, afterwards Caerleon, the headquarters of the Second Roman Legion, which place was near Newport, in Monmouthshire. From that point this road ran with a north-easterly direction through Abergavenny, and along the Welsh and English borders to Uriconium or Wroxeter, in Shropshire, where it joined with many other lines from all parts of Britain.

Iter 13 was a line of road commencing near Caerleon, or as the Romans called it, Isca Silurum, and running through the present Monmouth, Gloucester, and Cirencester, to Calleva or Reading, in the valley of the Thames.

Iter 14 commenced at Venta Silurum, supposed to be Caerwent, in Monmouthshire, crossed the Severn a little above Bristol, at Trajectus, and then communicated westward with Bath (Aquæ Solis, which was already famed for its mineral waters), and eastward with Reading.

Iter 15 commenced at Reading, and running south-westward, passed through or near the towns of Winchester, Old Sarum, near to Salisbury, Blandford, Dorchester, Honiton, and westward to Exeter.

Such were the main trunk lines of the Roman roads formed in Britain within the first hundred years after the Roman conquest of the country. Their effect was at once to supply the means of communication with every part of it south of the Roman Wall. This was the first step towards the forming of the scattered tribes of Britain into one nation. By means of these admirable roads, a citizen of York could with ease communicate with every part of

Britain south of the present towns of Carlisle and Newcastle-on-Tyne; as far westward as the borders of Wales and Cornwall; along the southern and eastern parts of England; with nearly all parts of the inland districts: with London, the southern capital; and with Rutupiæ, on the coast of Kent, the point of embarkation for the continent of Europe. These roads were so skilfully laid out and so strongly constructed, that they continued to be the high roads of England for more than a thousand years, and formed the outline on which the modern highways of England, and even some of the modern lines of railway, have been constructed. The main lines of the London and North-western, and the Great Northern railways seldom deviate more than a few miles from the lines of the Roman roads from London to Chester, and from London to York; the construction of both those great works, formed at a distance of seventeen hundred years from each other, having been influenced by the same considerations in the choice of the lines taken, except in districts where military reasons influenced the choice of the Roman engineers.

In addition to the five lines of Roman road which are described in the Antonine Itinerary as intersecting the present county of York, several other lines appear to have been formed in different parts of the same county. A considerable portion of these ran along the summits of the hills which separate the different valleys of the county from each other, and were probably constructed for military purposes, and at a time when this district was only partially subdued. Some of these mountain roads are still in excellent preservation, having been little interfered with, either by traffic or cultivation, since the retirement of the Romans from Britain. Even in the more fertile districts of the county the Roman roads have in some instances defied the ravages of time, and may still be traced, except in the deeper valleys, where the winter floods of nearly eighteen hundred years have greatly changed the level of the ground, and have caused them to be buried under great accumulations of earth and gravel. In the neighbourhood of York, some of the roads have been found at a depth of many feet below the present surface of the soil, and this is one reason why it is very difficult, and in some cases impossible, to discover any traces of lines of road of whose existence there is no doubt. In the neighbourhood of Chester, the ancient Deva of the Romans, and situated like Eboracum on the banks of a wide river, many Roman remains of roads and streets

have been met with more than twenty feet below the present surface of the ground.

Roman Capital and Stations in the Brigantine Territory.—Eboracum, or York, was the military, as well as the civil capital of Britain, during the greater part of the Roman dominion. One, if not two, of the legions maintained by the Romans in Britain, made Eboracum its head-quarters for nearly 300 years. The Sixth Legion, described as *Victrix, Pia, Fidelis*, or, perhaps, *Felix*, came over to Britain with Hadrian. It is never mentioned in the inscriptions found in the south of Britain; but its name occurs frequently in those of the north. In Hadrian's time this legion was employed in the works of the Roman Wall about Amboglanna (Burdoswald), Carlisle, and some other stations. It appears to have been afterwards employed in constructing the vallum of Antoninus Pius between the Clyde and the Forth. Dion speaks of this legion as stationed in the lower part of Britain, but this must be in relation to Caledonia, or the most northern part: for it is certain that about the middle of the reign of Antoninus Pius, or before A.D. 190, its head-quarters were at York, and continued to be so as long as the Romans remained in the island. It is mentioned in the "Notitia" as one of the two legions which still remained in Britain at the close of the Roman occupation. Eboracum, or York, was the centre of the district ruled by this legion. It supplied garrisons to most of the stations on the line of the Roman Wall, through the Lake Districts, and through the greater part of the present county of Lancaster. There it met with the outposts of the Twentieth Legion (whose head-quarters were at Chester), both at Mancunium the present Manchester, and at Rigidunum, or Ribchester, in the valley of the Ribble.

There is some reason to believe that the Ninth Roman Legion, originally raised in Spain, and known by the title of *Hispanica*, was also stationed at Eboracum or York, and gradually became incorporated with the Sixth Legion. The Ninth Legion came into Britain in the first invasion in the reign of the Emperor Claudius, but was nearly destroyed in the reign of the Emperor Nero in the insurrection of Boadicea; and its loss on that occasion was recruited by two thousand men, and eight auxiliary corps from Germany. It again suffered severely in Caledonia in the sixth campaign of Agricola, when, as Tacitus says, the enemy making a general attack in the night upon the Ninth Legion, which was the weakest, slaughtered the sentinels, and in the confusion of sleep and of

surprise burst through their entrenchments. The Ninth Legion seems to have been stationed at York before the arrival of the Sixth, and being weak from its heavy losses, it is thought to have been incorporated with the Sixth. In one inscription on a Roman brick it is called *Victrix*, though this title belonged not to this, but to the Sixth Legion. It is therefore conjectured by Horsley, that this honourable title was assumed by the soldiers of the Ninth Legion when incorporated with the Sixth. On a coin of Carausius it is designated *Leg. Gem.*, or *Legio Gemina*, the title given to a double or mixed legion. Hodgson says, that after the time of Agricola this legion is not heard of; but Wellbeloved states in his "*Eboracum*," that its existence was recognized so late as the usurpation of Carausius, and that there are memorials of it in York long subsequent to the time of Agricola. On the coins of Gallienus, the figures of a bull and of a lion appear with this legion.*

Eboracum was not only the head-quarters of one, if not two, legions, and therefore the military capital of this part of Britain, but it was also the seat or residence of the *Prætor*, and the place at which justice was distributed to the British subjects of the Roman empire. The Roman *prætors* according to Cicero ("*De Legibus*," iii. 3), were originally military officers, whose title designated the consuls as the leaders of the armies of the state. At a later period, however, other *prætors* were appointed, whose business was to administer justice in matters in dispute between strangers and Roman citizens. This officer, whose dignity was of the highest rank, was known as the *Prætor Urbanus*. As the limits of the republic and the empire extended, *prætors* were appointed for the purpose of administering justice in the provinces, and in the time of Pomponius there were eighteen *prætors* administering justice in the empire. The seat of the *prætor* of Britain seems to have been at *Eboracum* or York, although he appears to have held sittings and to have had a court and a residence at another place, also named the *Prætorium*, which was on the sea-coast either near Patrington at the mouth of the Humber, or in the neighbourhood of Bridlington and Flamborough. The chief *Prætorium*, however, seems to have been at York, and there it was that the *prætor* usually resided.

It is a matter of some interest that the Emperor Septimius Severus when he visited *Eboracum* or York, where he died about the year 207, was accompanied by one of the most celebrated

* *Eboracum*, or York, under the Romans, by C. Wellbeloved.

lawyers of Rome, who may possibly have assisted in organizing the administration of justice in this part of Britain. We are told that the reign of the Emperor Severus was particularly propitious to the science of the laws, and that his chief favourites and counsellors were selected from that learned order. Amongst these were Papinian, Julius Paulus, and Ulpian, three of the most rational and upright civilians who ever graced the profession of jurisprudence. Under their inspection he enacted many wise and equitable laws for the use of the empire at large, and some likewise for the government of Britain in particular, where he resided for the four last years of his life; keeping his court and administering justice at York, having the excellent Papinian for his assessor. Many of these laws were afterwards adopted by Justinian, and have a place in his Digest and Code. It is likewise thought very probable, that numerous principles of the civil law, which prevailed in very early ages over the greater part of this island, especially over the northern provinces, derived their origin from the ancient Roman masters of the country, and perhaps chiefly from this emperor. The Roman law, it is not improbable, continued to be taught in the city of York from that age. Aldhelm, bishop of Sherburn, who was born in 639, studied the Roman law at York; and Alcuin describes the same school as existing in that city in the year 804.*

Whilst the memory of one of the Roman emperors, who died at York, is closely connected with the improvement and the administration of the laws, the name of another, who assumed the imperial purple in the same city, is inseparably connected with the introduction and the establishment of Christianity in this country, as well as in the whole of the Roman empire. When Diocletian and Maximinian, who had been amongst the most cruel persecutors of Christianity, resigned the empire to the Cæsars, Galerius and Constantius Chlorus, Britain fell to the share of the latter, who immediately came over to this island, and fixed his residence at Eboracum; where, after two years, he died. Constantine the Great succeeded his father, having been proclaimed emperor by the army at York, where he was residing at the time of his father's death. There is even a tradition that Eboracum was the place of his birth, but the weight of evidence is altogether against that opinion. There has also been much dis-

* Eboracum, or York, under the Romans, by C. Wellbeloved, p. 14.

cussion as to the birthplace of Helena, the mother of Constantine, and at one time it was believed that she was the daughter of a British chief. This opinion is now generally abandoned, there being sufficient evidence that Helena was a woman of humble origin, a native of Drepanum in Bithynia (afterwards named by her son Helenopolis, in honour of his mother); or of Naissus, now called Nissa, a town of Moesia, where it is now commonly thought that Constantine the Great was born.* But wherever Constantine was born, there is no doubt that he assumed the command of the Roman empire at York, and just as little that his accession to the throne was connected with one of the most important events that has occurred in the history of the world. Though there was not much to admire in his life and character, yet he certainly conferred on the world one of the greatest services that has ever been rendered to it, by putting an end to the cruel persecutions to which the Christians had been subject in all parts of the Roman world, even down to the reign of Diocletian. This was an unspeakable benefit to society, whatever influence other parts of his policy may have had on the spread of Christian truth.

In addition to the numerous evidences of the presence of the Romans at Eboracum, marks of it have also been found at many other places within each of the three Ridings of the county of York. Taking Eboracum, or York, as a centre of the whole of the Roman roads of Yorkshire, we may trace the presence of the Romans at the following points chiefly along those lines.

Proceeding northwards from York, along the road traced in the first Iter, which reached northward to the eastern extremity of the Roman Wall near the mouth of the river Tyne, we find the following stations in the county of York :—

The City of Isurium, or Aldborough.—Amongst the Brigantine towns was Isurium, built on the site on which Aldborough now stands, near the point where the rivers Swale and Ure join to form the river Ouse, the great outlet for all the waters of the Brigantine territory, within the limits of the present county of York. Isurium is supposed to have been the ancient capital of the Brigantine territory, but was superseded either on the invasion of the Romans, or perhaps previously, by Eboracum, situated lower down the Ouse, at a position at which it is much more navigable, and within reach of the point to which the ordinary tides rise, and assist

* Eboracum or York, by C. Wellbeloved, p. 27.

in creating a motive power up the stream, as well as that which the current creates down it. This was so important for the purposes of navigation, that it would be quite sufficient to give Eboracum a great superiority over Isurium in the eyes of the Romans, who, as we have already mentioned, had a fleet on the north-east coast of Britain, which rendered them most valuable assistance in the campaigns of Agricola. This fleet it must have been of great importance to them to be able to place in perfect security when dragged up on land, according to the Roman custom, in the winter months. Thus it would be under shelter of the fortifications at Eboracum, but not at Isurium. The numerous Roman remains discovered at Aldborough and in the neighbourhood, will be described in a subsequent chapter.

Cataractonium, or Catterick Bridge.—Proceeding along the line of road at present known as Leeming Lane, which is a continuation northward from Isurium of the line described in the first Itinerary of Antoninus, we come to another Roman station situate on the river Swale, at the site of Catterick Bridge. This has always been considered to be the Cataractonium and Cataracton described by Ptolemy and Antoninus. In Camden's time it had nothing great except its name; but since then many remains of antiquity, including the outlines of a Roman camp, have been found in this neighbourhood.

"Three miles below Richmond," says Camden, writing three hundred years ago, in the reign of Queen Elizabeth, "the Swale flows by an old city, which Ptolemy and Antoninus call Cataractonium and Cataracton, but Bede Cataractan, and, in another place, the village near Cataracta; which makes me think that name was given it from the word Cataract, seeing here is a fall of water hard by, though nearer Richmond, where the Swale rather rushes than runs, its waters being dashed and broken by the crags it meets with. And why should he call it a village near Cataracta, if there had been no cataract of water there? That it was a city of great note in those times may be inferred from Ptolemy, because an observation of the heavens was taken there: for in his 'Magna Constructio' he describes the twenty-fourth parallel to be through Cataractonium in Britain. But at this day, as the poet says, it has nothing great, but the memory of what it was. For it is but a very small village, called Catterick or Catterick Bridge, yet remarkable for its situation by a Roman highway, which crosses the river here, and for those heaps of

rubbish up and down, which carry some colour of antiquity. Under the Saxon government it seems to have flourished; though Bede always calls it a village, till the year 769, when it was burnt by Eanredus, the tyrant who destroyed the kingdom of Northumberland. But after his death Cataractonium began to raise its head again; for in the seventy-seventh year after, King Ethelred solemnized his marriage here with the daughter of Offa, king of the Mercians. Yet it did not continue long flourishing, for in the Danish outrage which followed it was utterly destroyed." Many Roman remains have, however, been discovered in more recent times, which shall be subsequently described.

Pierce Bridge.—Proceeding still further northward towards the river Tees, the Roman road divides into two branches at the foot of Teesdale. One of the branches runs due north, and passes the river Tees at Pierce Bridge, where there are numerous marks of the presence of the Romans. It was supposed by Horsley that the Roman station of Magis mentioned in the "Notitia," and where there was a garrison commanded by the Præfectus numeri Pacensium, was at this spot.

From the city of York to a few miles north of Catterick Bridge, the line of road described in Iter 2 corresponds with that described in Iter 1, passing through Isurium and Cataracton. But after passing the latter place, the road described in the second Iter begins to ascend the valley of the Tees, and runs to the top of that valley.

Greta Bridge.—Ascending Teesdale, at Greta Bridge, Roman altars and coins have been found, and there is a camp, with plain marks of a station.* In the angle or corner of land between the river Greta and the stream known as Tutta beck, is a clearly marked Roman camp, on the line of the great military road which runs up the valley.

Lavatra, or Bowes.—Ascending the valley, the next Roman station come to is that of Lavatra, near the modern town of Bowes. The monuments erected there belong to different ages, commencing with the Emperor Hadrian, extending to the reign of the Emperor Severus, and coming down to the reigns of the Emperors Gallus and Volusianus, in 253.

Still ascending the valley of the Tees, we come to Verteræ, on the borders of Westmoreland, near the present town of Brough.

* Horsley.

From this point the road extends through Westmoreland and Cumberland, to the eastern extremity of the Roman Wall.

No Roman road has been traced up Swaledale, above Catterick; though there is reason to believe that there was a cross road from Lavatra to the neighbourhood of Reeth, which also extended to Bracchium in the present Wensleydale.

Bracchium near Bainbridge in Wensleydale.—In the valley of the Ure there appears to have been several Roman positions, in the neighbourhood of Well, Spennithorn, and Bainbridge. At Well, not far from Masham, a Roman pavement was discovered on the supposed line of Roman road up the valley. At Spennithorn, higher up the valley, near Middleham, there were formerly the marks of a Roman station, now levelled by the plough. Still higher, at Bainbridge, there are the remains of a Roman station. Here were dug up a statue of the Emperor Aurelius Commodus, and other objects of interest.

Cattal Magna.—The valley of the Nidd possesses few remains of Roman antiquity above Cattal Magna, where there seems to have been a camp at the point at which the Roman road crossed the river. But a road formed by the Romans has been clearly traced from Isurium across the higher part of the rivers Nidd, Wharfe, and Aire, and over the hills to Rigodunum or Ribchester, which was one of the principal towns or cities of the Brigantes.

Another set of Roman stations have been traced along the line of road leading from Eboracum or York, to Rigodunum, and along the high grounds which divide the valley of the Wharfe from the valley of the Aire. The principal Roman stations along this line were at Calcaria, the modern Tadcaster; at Adel, a little to the north of the town of Leeds; and at Olicana, near the present Ilkley in Wharfedale.

Calcaria, or Tadcaster.—This place is supposed to have been named from the *calx*, or lime, which is found in abundance in the neighbourhood. Between Tadcaster and Wetherby was the ford at which the Roman road crossed the river Wharfe. It received the name of Helens-ford possibly in honour of the mother of Constantine the Great.

Such is the opinion of Camden as to the site of Calcaria; and he also gives the sanction of his authority to the supposition that the ancient name of the town might be derived from the circumstance stated. The persons employed in burning lime are in the Theodosian

code named *Calcarienses*. Bede calls the place *Calcacester*. For other proofs of its antiquity Camden adds, that, "not to mention its situation near a Roman consular way, there are many coins of Roman emperors digged up, the marks of a trench quite round the town, and the platform of an old castle remaining." Of this castle Leland observes, that "a mighty great hill, dykes, and garth may yet be seen a little above the bridge. It seemeth by the plot that it was a right stately thing." Others think that the situation of *Calcaria* is now occupied by Newton Kyme, where Roman coins and many antiquities have been discovered. Gibson favoured this opinion; but the termination of the name, supported as it is by the abundance of antiquities collected about it, and the distance from *Eboracum*, seem to justify the more general preference given to *Tadcaster* as the site of the ancient *Calcaria*.

Aberford.—There is scarcely any part of England in which the line of the Roman roads is so strongly marked as between *Aberford*, near the river *Wharfe*, and *Castleford* on the river *Aire*. This was noticed by Leland in the reign of Henry VIII., and by Camden in the reign of Queen Elizabeth; and after the lapse of 300 years it is as clear as it was in their days, that *Aberford* stands on a Roman road, which all the way to *Castleford* appears very perfect. Near it is an old fort, called *Castle Cary*. In approaching *Eboracum*, the military capital of Britain, the roads appear to have been raised to that remarkable elevation above the general level of the adjoining land, which caused them to be known in after times as the high roads or highways of the kingdom, or in later times as the king's highways, which were in a special manner protected by the Crown. By the ancient laws of this kingdom, travellers robbed or injured upon these highways had a right to be compensated by the inhabitants of the district in which the offence was committed.

Barwick-in-Elmet, near *Aberford*, appears by the mounds of earth round about it to have been encompassed by a wall. Here is a remarkable mound, called *Hall Tower Hill*, which has two trenches round it. And on the north side of the town is a high and steep bulwark, part of the Roman way from *Bramham Moor*, and called *Wendle Hill*. There are other extensive works, some of which probably were commenced by the Romans, though they

may have been afterwards added to by the Anglian kings of Northumbria. But the Anglian kings had no great skill in building, and generally occupied the remains of the works constructed by the Romans.

Ascending the valley of the Wharfe to the neighbourhood of Ilkley, we find the remains of a Roman station, which is believed to be the *Olicana* mentioned by Ptolemy in his account of the Brigantine towns. Here was found a votive altar dedicated to the nymph or goddess of the Wharfe, under the name *Verbeia*. Here also were discovered several other interesting Roman remains, which will be more fully described in a subsequent chapter.

The Roman stations along the line of the river Aire, or on the hills which bound the valley through which that river flows, were *Lageolium*, built on the site of the present Castleford, near the point where the Aire is joined by the Calder; *Adel*, a short distance north of the town of Leeds; and several points on the grassy hills of Craven, over which they made their way to the western sea.

Lageolium, or *Castleford*, was a military position of great importance on the main road from *Eboracum* or York, to *Danum* or Doncaster, and through Lincoln to London. The outlines of the Roman camp can still be distinctly traced on the bank of the river Aire, which is here wide and deep, and was frequently used for warlike defences, even down to comparatively modern times.

Adel, near Leeds.—At *Adel* near Leeds, on what was then a wild moor, there was discovered in the year 1702 the outline of a Roman camp, with many fragments of urns and a sepulchral inscription with figures supposed to represent the *Deæ Matres*.

Roman remains have been found at several places higher up the valley of the Aire, and on the adjoining hills, which were traversed by Roman roads. The principal station on this line of road appears to have been at *Adel*, near Leeds; but at *Cookridge* also, on the road from *Adel* to *Olicana* or *Ilkley*, at a place called *Black-hill*, many Roman coins have been found.

Bingley.—Higher up the valley of the Aire, in the parish of *Bingley*, there are traces of the presence of the Romans. In this parish, between *Hanworth* and *Cullingworth*, a paved

way has been observed of an unusual breadth, doubtless a Roman road. It appears, to have been above twelve feet broad, and regularly formed of such stones as the place afforded.

Skipton and Gargrave.—Still ascending the valley of the Aire, we find traces of the Roman dominion in a villa constructed on the south bank of the river, a little beyond Skipton. Here is also a camp, and a Roman pavement has been discovered at Gargrave.*

It was at this opening of the hills that the Romans made their main road across the island, from Eboracum to Ribchester; this being much the lowest passage through the Penine range of hills; now generally known as the Back-bone of England, and traversing a country much more fertile than the districts either to the north or to the south.

In the valley of the Calder, and on the adjoining hills, many remains of the Romans have been found. The most important of these are supposed to be connected with the ancient Cambodorum on the road from Eboracum to Mancunium. Camden, whose judgment was very sound, placed the site of Cambodorum at Almondbury, near Huddersfield, where there are many remains of antiquity, and a commanding military position. Some more recent writers, including Hunter, whose authority is also high, place Cambodorum at Greetland, near Elland, on the Calder, where an altar was discovered, dedicated to the tutular deity of the Brigantes. Other authorities have been disposed to fix the site of Cambodorum at Slack, in the same neighbourhood, where there are also the remains of an important military station. Roman coins have also been found near Stainland; in fact there are few districts of Yorkshire in which the remains of the Romans are more abundant. These valleys formed the entrance of one of the most important military passes in Britain, through which the Sixth Legion stationed at York, and the Twentieth Legion stationed at Chester, kept up their communications across the most mountainous part of the Brigantine territory. Considerably higher up the valley of the Calder, in the neighbourhood of Hipperholme, large quantities of Roman coins have been found belonging to the age of Diocletian, Carausius, and Allectus. These were found buried in a thick glass vessel.

* Gough's "History of the County of York," vol. i. p. 100.

Near Halifax, at *Sowerby*, many Roman coins have been turned up by the plough, and a small votive altar discovered.*

The Roman stations in the valley of the Don were Danum, the present Doncaster, and the strong fort erected at the angle or tongue of land situated at the point where the Rother flows into the Don. Danum, or Doncaster, continued to be occupied by the Romans to the close of their dominion in Britain, and was held by bodies of cavalry, which defended the level country on the lower banks of the river. The Roman station at the mouth of the Rother is supposed to have been at the southern limit of the province, and is sometimes described as *ad fines*; it has also been described in more ancient times by the name of Temple Brough, a name partly derived from the Latin, and partly from the Anglian language.

Many traces of a Roman road have been discovered between Lageolium, the present Castleford, and the town of Derby. This road is supposed to have crossed the river Don, near the junction of the Rother with that stream, and at a point where there is still a Roman camp.

Temple Brough is, says Gibson, a fine Roman fortification on the river Don, before it comes to Rotherham. The north-east corner of it is worn away by the river. The area is about 200 paces long, and 120 broad, besides the *agger*; and without is a very large trench, thirty-seven paces deep from the middle of the rampire to the bottom. On the opposite side of the river is the bank called Danes Bank.†

The Roman roads running from York eastward to the German Ocean, are somewhat more difficult to trace, partly owing to the softer materials for road-making supplied by the stone of that district, and partly owing to the great liability to floods existing in the valleys of the eastern side of the county, which has caused many objects of antiquity either to be washed away, or to be completely buried by the soil to so great a depth as to render it difficult to trace them.

There is reason to believe that an ancient Roman road ran northward from Eboracum to the mouth of the river Tees, but no towns can be mentioned along this line.

There are clear traces of a line of Roman camps and of a road connecting them with each other, running from Eboracum in a

* Hearne's Leland.

† Gibson.

north-east direction to the supposed site of Dunum Sinus, mentioned by Ptolemy, and supposed to be situated at Dunsley Bay, near the present port of Whitby, or perhaps at Whitby itself. The stations along this line may be traced near Stamford Bridge, Malton, Cawthorne, and on the banks of the river Esk, which flows into the sea at Whitby. There are also lines of road running from the neighbourhood of Malton across the southern entrances of the principal valleys of Cleveland, and communicating with a road already mentioned as running northward, from Eboracum to the entrance of the river Leven which falls into the Tees.

Malton, the site of a Roman camp, and supposed by some writers to be the ancient Derventium, though the distance from Eboracum, or York, does not agree with that given in the Antonine Itinerary, which is only seven Roman miles, as has been already noticed. A Roman inscription was dug up in some pits near the lodge. In connection with Malton the *equites singulares*, a part of the emperor's body-guard, are here first mentioned in Britain.*

Pickering.—On the moors, in this part of Yorkshire, have been found a Roman camp, or rather four together, to which an ancient road, now named Wade's Causeway, leads. Many tumuli of different sizes are scattered about, and urns found in them.†

Millington.—On the south side of a hill half a mile north-east of this town have been found many foundations of buildings, Roman pavements, tiles, &c.‡

Metham.—On the moors at this place have been discovered the remains of a Roman pottery, with pieces of broken urns and cinders.§

Eastness in Rhydale.—A Roman inscription dug up.||

The Roman road described in the first Iter of Antoninus, runs eastward from York towards the sea, through the stations of Derventium, Delgovitia, and Prætorium. It was the opinion of Camden and other antiquaries of earlier times, that the road described by Antoninus ran from York to the entrance of the Humber near the present town of Patrington, in the neighbourhood of Hull. They were disposed to place the site of the first station on that road which was named Derventium, at the point on

* Gough.

† Ibid.

‡ Ibid.

§ Lacombe's Gazetteer.

|| Gale.

the river Derwent, which evidently gives name to the station, at a distance of seven miles from York, which is the distance mentioned by Antoninus. They were next disposed to place the site of Delgovitia in the neighbourhood of Market Weighton, and more particularly at the village of Godmundingham, near that town, where there were ancient idol temples, from which the name of Delgovitia, was supposed to be derived. The third station mentioned in that Iter under the name of Prætorium, which must have been the residence of the Prætor, and a very important place in the government of the northern part of Britain, they proposed to place near the mouth of the great port of the Brigantine territory at Patrington, near Hull. Many ingenious reasons have, however, been brought forward for placing those three stations at other points. Thus Derventium has been placed at Malton, where there are abundant evidences of the existence of an extensive Roman station; whilst Delgovitia has been placed upon an ancient road which certainly leads for Derventium, over the Wolds of the East Riding towards the sea; and Prætorium has been placed in the neighbourhood of Bridlington near the great promontory of Flamborough Head, the most conspicuous headland on that part of the coast. In a subsequent part of this work, when we speak of these places separately, we shall give a brief sketch of the arguments on which these opinions are founded. All that is necessary at present to do, is to state that the sites mentioned in the Antonine Itinerary are claimed by these different places. There can be no doubt that in the ages in which these towns were built, their prosperity and even their existence depended chiefly on the fact or the circumstance of whether they were, or were not, situated on the Roman road. This is clearly shown by the following considerations:—

“These roads,” says the learned author of ‘Eboracum, or York under the Romans’ (C. Wellbeloved), “raised above the surrounding surface, were laid in as straight a line, between place and place, as could well be drawn, and composed of the most durable materials that the country through which they passed could furnish; occasionally, in part at least, of materials brought with great labour and expense from a considerable distance. In marshy lands they were constructed on piles. They were generally paved with large irregular blocks of stone, supported by strata of cobble stones or flints, of broken stones cemented with lime, of chalk, or gravel.

They appear to have varied in breadth ; some, exclusive of the foot-path by the sides, being twenty, while others were only fifteen, thirteen, or eight feet wide. From the nature of their construction they were called *Viæ Stratæ*, whence the Italian denomination, *Strada*, and our word, *Street*. By the aid of this latter term, we are now able to trace the line of some of these roads in our country, even when all remains of such works have disappeared.

“The primary objects of these roads was to render the marches of the legions to the most distant parts of the empire easy and expeditious ; and nearly allied to this, to provide the means of rapid communication between Rome, the seat of government, and the remotest provinces. For this purpose, especially, posts were established on these roads, at short distances from each other, so that by means of couriers passing from one post to another, information could be conveyed to the capital, and orders transmitted to the provincial authorities or the armies with great celerity. These posts were probably first established by the Emperor Augustus. The young men whom he placed on them as couriers performed their service on foot. To obtain greater celerity, Augustus afterwards employed relays of horses or mules, and the emperors who succeeded him maintained these establishments. The places on the roads where these were kept were *Mutationes*, “change-houses,” erected at a moderate distance from each other, and provided each with forty horses or mules ; carriages also of different kinds were placed at the *Mutationes*, by means of which journeys were performed with ease as well as rapidity. Post stations, called *Mansiones*, where travellers might pass the night, were established at greater intervals, at about the distance of twenty English miles, the length of a day’s journey. These, which were probably at first places of encampment, being originally called *Castra*, afterwards were furnished with barracks for the soldiers, granaries or magazines of provisions, and also with buildings suited to the reception of travellers of all ranks, even of the emperor himself. Artificers also were stationed along the great roads, whose services might be required in the fabrication or repair of armour ; and under the later emperors at least, mints were established in some of the principal cities on their line. Off the sides of these roads, and near the cities through which they passed, were temples erected in honour of the gods, villas surrounded with gardens, triumphal arches,

and cemeteries adorned with tombs and monumental urns and pillars."*

The Influence of the Roman Dominion in this part of Britain.—The whole of Britain, south of the Roman Wall, may be considered to have been settled into the form of a Roman province from the age of the Emperor Hadrian and his successor Antoninus Pius. The last insurrection in which the Brigantes took part against the Romans occurred in the reign of the latter emperor; and although it was at one time highly dangerous, it was ultimately subdued, and a considerable quantity of the land of the Brigantes was taken from them as the penalty of their offence. We are not told by Pausanias, who mentions this insurrection and this confiscation of Brigantine lands, to whom the lands thus confiscated were granted. It is probable, however, and almost certain, that a considerable portion of them was given to the soldiers of the Roman colony established at York. It was a common practice with the Romans, after putting down an unsuccessful insurrection, to plant a colony, or colonies, consisting of soldiers and their families. This circumstance accounts in some degree for the fact, that several of the Roman legions, when once established in a conquered country, continued there from generation to generation. Thus, for instance, the Sixth Roman Legion had its head-quarters at Eboracum, or York, for a period of nearly 300 years; and the same observation applies with some slight modification to the Twentieth Roman Legion, which was established at Chester for nearly an equal period; and to the Second Roman Legion, which was established for an equal period at Isca Silurum, on the river Usk at Caerleon, within two or three miles of the site of the present town of Newport in Monmouthshire. There must have been some very permanent tie in the connection of these three legions with the districts which they occupied for so many ages. The most enduring tie is the ownership of the soil, or an interest in a considerable portion of its produce. The effect of the arrangement by which the Roman legions were thus permanently established in a few chosen places, must have been to introduce an unusual portion of the arts and the intelligence of the governing class into those districts.

As far as we have the means of judging, this part of Britain

* Eboracum, or York under the Romans. By C. Wellbeloved, 1842.

under the Romans enjoyed at least as good a government as any other portion of the Roman empire; and, from its insular position, may perhaps have enjoyed a greater freedom from the ravages of war, and from military oppression, than the provinces along the German border, which were always more or less exposed to invasion from the vast tribes of warlike Germans, who not only held the military line of the river Rhine, but also frequently pressed far within the limits of Gaul, superseding the Celtic by the Teutonic race. It is true that even the Britons residing to the south of the Roman Wall, were never altogether free from the incursions of the bold mountaineers who resided to the north of that line. But from the great superiority in point of numbers of those residing to the south of the Wall; from the great strength of the fortifications extending from the mouth of the Solway, to that of the Tyne; and from the strength and military discipline of the Roman legions, the Britons must have enjoyed under the Romans a much greater tranquillity than they had ever experienced under their native chiefs. If they were ever exposed to attack from enemies to the north of the Wall, it must have been owing to the ill-regulated ambition of such of the emperors as attempted to conquer the northern part of Britain, and thus compelled the native tribes to fight for their own homes, and, in a few instances, induced them to burst through the Roman fortifications, and to carry the war into the enemy's country.

In the reign of Antoninus Pius, the Roman commander in Britain, Lollius Urbicus, drove back the North Britons from the wall of Hadrian, and formed another line of fortification across the isthmus of the Clyde and the Forth—a line which had been originally fortified by Agricola, but which had been abandoned before the visit of the Emperor Hadrian to Britain. It is not certain how long this more advanced line was held by the Romans, nor precisely at what age it was abandoned. But a great struggle took place about the year 208, in the reign of Septimius Severus, in which the ancient line was probably re-established as the permanent boundary. About the year 206 or 207* Septimius Severus arrived in Britain with his two sons, M. Antoninus Bassianus (Caracalla) and Geta, and established himself and the head-quarters of his army at Eboracum or York, with the intention of conquering the whole of the northern parts of Britain. In the year A.D. 208

* Eboracum, or York under the Romans, p. 13.

Severus marched into the country north of the Roman Wall, and is said to have forced his way into the Highlands, and perhaps, at some points, even to the northern extremity of Britain. In the course of a long and bloody campaign he destroyed great multitudes of the Caledonians, but is said himself to have lost nearly 50,000 men, either from the sword of the enemy, from famine, or from disease. He ultimately returned, as he supposed victorious, to York, though with his own health broken by the hardships of the campaign. There he died soon after, having had the mortification to learn on his deathbed that the Britons, to the north of the Wall, were again in arms against the Romans. This seems to have been the last great effort made by any of the Roman emperors to subdue the northern parts of Britain, for a period of from 150 to 200 years. It is probable that a considerable portion of these years was a time of comparative peace, and of as much prosperity as the laws of the Roman empire and the habits of the British people enabled them to enjoy. There is no doubt that during this period the revenues yielded by the tributes of Britain became large and valuable; and that agriculture was carried on with such success as to enable the Britons to supply the Roman garrisons along the Rhine with large quantities of grain in years of famine, caused either by bad seasons or by the invasion of the German hosts, which still hung along the north-eastern boundaries of the empire, and threatened that irruption of the northern barbarians which took place after the departure of the Romans from this country.

It was chiefly between the years 200 and 400 that the superstitions of the Druids of Britain, with all their bloody and murderous rites, gave way to the teachings of Christianity. Nor were these teachings confined to those parts of Britain that were subject to the Romans, for we are expressly told by Tertullian that Christianity had been introduced into regions of Britain into which the Roman armies had been unable to penetrate. Long before the Romans finally abandoned Britain, it had become a comparatively civilized country; and the same observation applies to all parts of the British Islands. Even after the vast hosts of Germany had overrun the greater part of Britain, as well as nearly the whole of the Roman empire, the light of Christianity continued to burn clearly in the more mountainous and more inaccessible portions of Britain and of Ireland, and from those regions again extended

to Britain, to Germany, and to the pagan tribes which then inhabited Gaul and Scandinavia.

But previous to the recognition of Christianity by the Roman emperors, the seas around Britain began to be infested by the Germanic tribes, which in succeeding ages conquered and settled in Britain. So great were the perils even of crossing the Channel for Boulogne in Gaul to Rutupiæ in Kent, that the Roman emperors found it necessary to take into their pay, for the purpose of protecting the Channel, some of the more daring of the German chiefs, whose fleets had so often plundered voyagers passing it. Amongst the most formidable and the most distinguished of these chiefs, was Carausius, who was employed as the guardian of the British Channel by the emperors Maximus and Diocletian, about the year 284, and who gradually became so strong, that he not merely seized upon the Channel, but made himself sovereign or emperor of Britain. So formidable was his power that it required all the energy of Constantius Chlorus, the father of Constantine the Great, to put down the usurper, and to re-establish the authority of the Romans in Britain. From this time forward the seas of Britain began to be infested with tribes of Saxon and other German pirates, who continually threatened the security of the coasts of the empire, and ultimately established their own dominion in Britain.

There is reason to believe that considerable districts of Britain had been occupied by the Saxons previous to the retirement of the Romans. Prior to that event there was a portion of Britain which was known by the name of the Saxon Shore, and which was under the government of a Roman general, known as the Count of the Saxon Shore.

The authority of this officer extended along the coast of what we now call the counties of Norfolk, Suffolk, Essex, Kent, and great part of Sussex; and was employed either in maintaining order amongst German tribes which had settled in those parts of Britain, or in preventing further inroads of the same tribes. This was the commencement of the occupation of the whole of the more level and fertile districts of England, Scotland, and ultimately of Ireland, by the same race.

The Romans appear to have remained at Eboracum, or York, until near the close of their dominion in Britain. This appears from the "Notitia," which is a kind of register of the several military and civil

officers and magistrates in Britain, and in other parts both of the western and the eastern empires, down to the times of Arcadius the emperor of the East, and Honorius the emperor of the West, at the beginning of the fifth century. This official return both shows what positions continued to be occupied by the Romans in Britain down to that period, and enables us to judge of what parts of the island had been abandoned by them previous to their final departure from Britain.

At the time above-mentioned the whole of the western and great part of the north-western portion of Britain had been abandoned, including Deva or Chester, which had long been the head-quarters of the Twentieth Victorious Legion, and Isca Silurum, afterwards known as Caerleon, which had also been the head-quarters of the Second Augustan Legion. The Twentieth Legion is not mentioned at all in the account of the Roman forces in Britain given in the "Notitia," and it is well known from the poems of Claudian and other sources that that legion had been withdrawn from Britain some years before, and had been employed in defending Italy against the Gothic invaders, who captured the city of Rome itself in the year 410, under the command of their formidable leader Alaric.

The Second Augustan Legion, which had so long been stationed in South Wales, still remained in Britain in the reigns of Arcadius and Honorius, but it had been removed to Rutupiae in the present county of Kent; and there it guarded the communications of the Romans with the continent of Europe, and watched the Saxon shores, extending northward as far as the present Norfolk, and southward and westward as far as the most western part of the present county of Sussex. It also no doubt guarded London, which had long been the chief commercial city of Britain.

In the north of Britain the Romans still retained the line of the Roman Wall, to prevent the irruption of the northern and independent Britons into the Roman province, which was at that time subdivided into the five districts of Maxima Caesariensis, Valentia, Britannia Prima, Britannia Secunda, and Flavia Caesariensis, the boundaries of which are only imperfectly known.

The following feeble garrisons appear to have preserved a shadow of the Roman power in Britain down to the close of the Roman dominion, but to have finally withdrawn about the year 420,

leaving Britain open to the daring races of the north, which soon afterwards began to pour into it, and in the course of a few generations conquered the island and peopled it with the Anglian race.

Eboracum, or York, the seat of the Prætorium, appears still to have been the head-quarters of the Sixth Legion, an honour which it owed to the fact of its still being the military and judicial capital of Britain; and around it there were a number of Roman garrisons, which appear to have been maintained to the close of the Roman dominion. Amongst these garrisons were the following. To the south, Danum or Doncaster, which was occupied by a body of Roman cavalry commanded by an officer who is described as the *Præfectus Equitum Crispianorum*, an officer who no doubt, kept open the communications with the south, and guarded the level district of country on the banks of the Don and towards the mouth of the Humber. Further to the north was Lavatra, on the main road leading from York to the western end of the Roman Wall; and near it was Verteræ, on the same line of road. These were on the sites of the modern towns of Brough and Bowes. The officer in command at Lavatra is described as the *Præfectus numeri Exploratorum*, and the officer in command at Verteræ is described by the title of the *Præfectus numeri Directorum*. Another station, described by the name of Magis, is supposed by Horsley in his essay on the "Notitia," to be the station now known as Pierce Bridge, on the banks of the Tees and the borders of the present counties of York and Durham. The officer in command at Magis, whatever may have been its position, is described as the *Præfectus numeri Pacensium*. Another garrison still nearer to Eboracum was that of Derventium, mentioned by Antoninus as being only seven miles distant from York. This appears to have been garrisoned by a body of citizens connected with the place itself, for the commander is described as the *Præfectus numeri Derventionensium*. The other garrisons, though not within the limits of the present county of York, seem to have been chiefly between Eboracum and the Roman wall. Amongst the places occupied by them were Longovicum, supposed to be the present Lancaster; Barbo-niacum, believed to be Overbury, also in Lancashire; and Arbeia, believed to be Moresby on the coast of the present Cumberland.



